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# Commonwealth Bureau of Plant Breeding and Genetics

# Plant Breeding Abstracts

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*** General studies, see also individual crops.**

# Plant Breeding Abstracts

## Vol. XVIII, No. 4

### *STATISTICS 519

1962. Cochran, W. G. and
Bliss, C. I. 519.24
**Discriminant functions with covariance.**
Ann. Math. Statist. 1948 : **19** : 151–76.

The application of the discriminant function to populations in which the covariance variates are known to have the same means is discussed. The theory of the procedure devised is developed with the assistance of Mahalanobis' concept of generalized distance.

1963. Conagin, A. 519.24
Uso dos testes estatísticos na experimentação agrícola. **(Use of statistical tests in agricultural experimentation).**
Rev. Agric., S. Paulo 1947 : **22** : 340–56.

An elementary account is given of the normal distribution, the *t* distribution, analysis of variance and significance tests.

1964. Wang, C. M. 519.24:631.421
**(Methods of determining the degrees of freedom for errors).**
Mem. Coll. Agric. Nat. Taiwan Univ. 1947 : **1** : Pp. 20.

Methods of estimating the degrees of freedom for errors in experimental designs are discussed, with special reference to pseudo-factorial arrangements.

### *BREEDING 575

1965. 575:633(39.4)
**Report of the United States-Syria agricultural mission.**
Int. Agric. Collab. Wash. 1947 : No. 4 : Pp. 99.

A report is presented of the United States Agricultural Mission to Syria in 1946. The present status of agriculture in Syria and the possibilities of agricultural development are considered, and recommendations are given for progress in various branches of agriculture. The report draws attention to the benefits which could be obtained by using the wealth of native material in breeding and selecting wheat and other crops, and by an adequate system of distribution of seed and planting material to farmers.

1966. 575:633(42)
**Plant Breeding Institute, Cambridge.**
Nature, Lond. 1948 : **161** : p. 714.

The Plant Breeding Institute at Cambridge is to be transferred to a site offering greater facilities to an increased staff, and management by the University is to be transferred to an independent body. The Institute will be concerned with all the arable and pasture crops grown in the eastern and drier parts of Britain, but the interests of other regions in certain crops will not be neglected.

The crops on which work has so far been done at the Institute are enumerated and some of the new varieties introduced as a result of this work are mentioned.

1967. Molle, A. 575:633(42)
Où en sont les sciences agricoles en Angleterre? **(How are the agricultural sciences progressing in England?)**
Ann. Gembl. 1948 : **54** : 78–96.

Notes are presented on the lines of research, including plant breeding, which are being followed at the principal agricultural research centres in England.

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* General studies, see also individual crops.

1968. Bonvicini, M. 575:633(45)
Metodi scientifici e mezzi organizzativi per il progresso della genetica vegetale agraria. (**Scientific methods and means of organization for the progress of plant genetics applied to agriculture**).
Ann. Accad. Agric., Bologna 1943 : **4** : (N.S.) : Pp. 23.

The author emphasizes the danger of allowing old established varieties of crop plants to die out completely, even if they are defective in certain respects, and illustrates the argument by reference to the tomato varieties of the Parma district in Italy. The local varieties became very mixed and started to be superseded by foreign varieties. By careful selection within the local varieties, however, forms have been produced which excel all imported varieties as well as the original parents. The author regards selection as being still the main basis of breeding work. Hybridization can of course give useful results but only if carried out on a sufficiently large scale, particularly when interspecific crosses are involved. For this reason this work, as well as more recondite investigations such as those dealing with artificial mutations, the use of colchicine, etc., should be confined to the larger institutions where the necessary equipment and staff are available.

A plea is made for more genetical instruction to be included in the university courses.

1969. 575:633(47)
Naučnyĭ Otčёt Moskovskoĭ Gosudarstvennoĭ Selekcionnoĭ Stancii za 1943 god. (**Scientific Report of the Moscow Breeding Station for 1943**)
1945 : Pp. 130.

*Vysokos, G. P.* (*Breeding and seed production of winter rye*). (*pp. 13–19*).

When rye plants being grown for seed production are allowed to grow in propinquity to a number of the best varieties, the resulting seeds give rise to more vigorous plants; the product, though showing little or no segregation, is subjected to individual family selection and the best families only are retained for seed production; the élite seed so produced has given yields of 20–30% more than ordinary seed. The average yield of Vjatka rye rose from 10·1 c. per ha. in 1940 to 15·4 c. per ha. in 1943 as a result of this process and that for Lisicyn rye from 9·6 to 14·7 c. per ha. Similar effects were obtained with Petkus and other varieties. The hybrid lines also had a distinctly higher baking quality and gave bread of better flavour.

*Veselov, B. M.* (*Breeding and seed production of winter wheat*). (*pp. 20–30*).

Plants arising from seed obtained by intravarietal crossing have shown a significant superiority in yield and winter hardiness in comparison with those obtained from ordinary seed. Emasculated plants were also left to open-pollinate amongst a large collection of varieties and the resulting $F_2$ populations showed little or no segregation, except the rye-wheat hybrid No. 46/131, which had 6·5% of off types.

The yields were 197·6% of that of the standard in Erythrospermum 1630, 164·2% in Serp i Molot [Hammer and Sickle], 118·0% in Lutescens 020 and 184·3% in Erythrospermum 917. The segregation was greater when only a limited number of pollinating varieties were available. However, in no case did segregates of the wild type appear, as so often happens in artificial crosses between two varieties.

Several new varieties have been produced by the method described, and several existing varieties have been improved in winter hardiness and other characters. So far no improvement has been achieved by means of artificially crossing two varieties and that method may be given up altogether.

By subjecting certain of the best varieties to partial vernalization segregation has been induced and some of the segregating forms have displayed higher resistance to frost or to drought, combined with satisfactory yield.

*Preobraženskaja, N. P.* (*Breeding and seed production of oats*). (*pp. 34–42*).

The main varieties cultivated in the Moscow and adjacent provinces have been Moscow A–315 and Pobeda [Victory]. Line 013, a selection from Moscow A–315, exceeds it in yield and size of grain, with a 1000 corn weight of 41·1 grm. Certain other lines, selected from American varieties have proved resistant to frit fly; one of these, A–184, has yielded 12·3% more than the standard, A–315. A–146 is resistant to loose smut. B–190 is a selection from Šatilovo 056 and is characterized by pubescence of the base of the lowest grain, broad grain of good quality and yield 6·4% above the standard; it also ripens three days earlier.

In seed production work it was found that the yield was influenced by the place of origin of the seed and the size of the grains sown.

*Davydovskaja, S. N.* (*Breeding and seed production of leguminous crops*). (*pp. 43–57*).

**Peas**

In the black-soil and podzol zones the Viktoria pea type gives the best yields whereas in the grey forest soils the Kapital type does best, apparently owing to its greater drought resistance.

An attempt was made to inprove the varieties Kapital and Mahndorf Viktoria by intravarietal crossing. Yield increases varying from 4 to 23% were obtained; the latter increase was gained by growing the treated seed in pots, the control being grown under normal conditions. A yield increase of 12% was obtained in the variety Kapital by individual family selection. A late maturing form with much improved quality and a mid-early form with poor cooking quality are among the selections obtained and bear witness to the great variability of the peas of this type. Some of the tall, late varieties of the *vulgatum* type show signs of being superior to the Kapital peas in both yield and quality. One of these is Tuljskiĭ; 2, which is also more resistant to *Ascochyta*. Some of them have been crossed with Viktoria peas and over 2000 progenies have been examined. Segregation was observed for morphological features and time of ripening, forms both earlier and later than the parent being observed. The best selections exceeded Kapital in yield by amounts varying from 15 to 50%.

Experiments have shown that the yields are affected very considerably by the locality in which the seed is grown.

Varietal tests with field peas have shown that the late-maturing types are best suited to the conditions of the Moscow province.

**Vetch**

Tests of varieties have shown that Tuljskaja 1 is the best in quality and yield of hay and it is being subjected to further breeding work; the results of individual plant selection have shown it to be very mixed and hence susceptible of improvement.

**Kidney Bean**

Tests have shown it to be possible to grow kidney beans successfully in the Moscow province as a field crop and the variety Triumph seems quite suitable.

*Šostak, O. F.* (*Breeding and seed production of buckwheat*). (*pp. 58–67*).

The station's selection Tuljskaja 10 is earlier than the standard variety Bogatyrj [Warrior] and surpasses it by 116·8% in yield and by 21·7% in extraction. A number of other varieties, among 133 local forms examined, also proved superior to Bogatyrj and details of these are given.

*Vysokos, G. P.* (*Millet breeding*). (*p. 68*).

The results of comparative tests of eight varieties are reported.

*Vysokos, G. P.* (*Domestication of kok-saghyz*). (*pp. 71–95*).

The present methods employed in the cultivation of kok-saghyz are described. The majority of the plants in the present populations flower in the first year, though a few flower only in the second year and certain others vary according to the conditions of growth. Plants with high rubber content have been found but the property has not been transmitted to the offspring.

The various factors influencing rubber content are discussed. The average rubber content is 1·67% of the dry weight but varies in different plantations from 1·04% to 2·25%. About 21% of the plants contain no rubber at all. Selection work has consisted in retaining the largest roots with the highest rubber content. No immediate increase in root size has been observed as a result of this process but the values are said to rise gradually when it is applied over a period of several years, provided the plants are grown under favourable conditions.

Plants produced by vegetative multiplication had much larger roots with a rubber content two to three times higher than plants arising from seed and this is thought to be a more effective way of improving kok-saghyz than reproduction from seed. Indications are given of the best methods to adopt for vegetative reproduction.

*Gusev, P. S.* (*Breeding and seed production of perennial herbage plants*). (*pp. 96–112*).

Observations have been made on selections of red clover and lucerne and reports are given on flowering, seed production and yield of green matter, especially in the early spring, and of hay; also on the relative percentage of leaf and stem, and on drought and cold resistance. In almost all respects lucerne was superior to red clover; within each group of lucerne the differences between the varieties were very slight. The hybrid varieties of *Medicago sativa* are the most suitable for growing in new areas and yellow lucerne is thought to be of interest only for grazing and for hybridization.

The main work on perennial grasses was carried out with timothy and 36 promising families were selected in 1941 on the basis of vigour of development and leafiness. Observations were also made on meadow fescue, of which 46 families were selected on the basis of standing capacity and leafiness; on *Bromus inermis*, selected for compact habit; and *Dactylis glomerata*, in which nine plants were selected for good development, leafiness and uniform development of the fruit-bearing branches. Meadow foxtail was selected for leafiness and vigour of growth but was finally abandoned as being unsuitable. Selection work has also been started with English and French ryegreass; with *Agrostis alba*, *Poa pratensis* and *Festuca rubra* a certain amount of work has been done but so far without much success.

1970. 575:633(47)

JAHTENFELJD, P. A. [JACHTENFELD, P. A.] 633.1:581.056(211)

**(Breeding stations in Eastern Siberia).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 16–21.

The Kamala breeding station has produced the wheat Lutescens 1729, which is early, resistant to lodging, spring drought and loose smut, and has large grains; it is a hybrid from Balaganka crossed with a variety Albidum No. 25/626 from South Africa. The station has also produced an early maturing variety of *Triticum durum* with tough rachis and grains which thresh out easily.

Other products of the station include an improved form of Lisicyn's rye obtained by open pollination with other varieties; cold resistant yellow and blue lucerne; and the red clover variety Lev Sibiri [Lion of Siberia], a very early, low growing, cold resistant clover selected from local wild populations.

The Tulun breeding station has produced the early wheats Tulunka and Udarnica [Shock-worker], both of which are better than Balaganka in resistance to lodging and to bunt and smut, and in baking quality. The station has also produced improved varieties of oats, barley, millet and potatoes, and cold resistant red clovers characterized by low growth, earliness and high seed production.

The Onohoe breeding station in the Burjat-Mongolian Republic has produced, by selection from local forms, oat varieties which thrive better than Golden Rain; it has also produced improved early ripening wheat varieties and an early maturing form of the Early Rose potato.

1971. 575:633(48.5)

JAGMIN, J. 633.52:575.243.061.6:537.531

60-lecie założenia Szwedzkiego Związku Hodowli Nasion w Svalöf.

**(The 60th anniversary of the foundation of the Swedish Seed Association at Svalöf).**

Przegl. Doświad. Roln. (Rev. Agric. Res.) 1946 : **3** : 31–36.

The organization and work of the Svalöf Institute are described. The research recorded includes the study of polyploids, mutations and the use of colchicine and X-rays to produce polyploids and other variations. The action of X-rays has produced a flax mutant in which the green parts are a much lighter colour than is normal, showing the decreased amount of chlorophyll. This flax, in the climate of Southern Sweden and on well manured soil differs from other flaxes by being less luxuriant in growth and at the same time having a higher yield of fibre of better quality.

Varieties of plants from Poland are well represented, especially those such as flax, hemp, rape, agrimony and soya bean from the districts near Wilno.

The work of the Institute is surveyed from Swedish sources in annual reports regularly reviewed in *Plant Breeding Abstracts.* E. W.

1972. KOOPMAN, C. and
MASTENBROEK, C. 575:633(49.2)
Coöperatieve aan- en verkoopvereeniging "Centraal Bureau uit het nederlandsch landbouw-comité" G. A. Rotterdam. Enkele resultaten der laatste jaren. **(Co-operative buying and selling association Central Bureau of the Netherlands Agricultural Committee, Rotterdam. Some results of recent years).**
Meded. Veredelingsbedrijf LandbGewassen Hoofddorp 1947 : Pp. 23.

*Stamonderzoek binnen het ras Staring.* (*Line research in the variety Staring*). (*pp.* 2–4).

The wheat variety Staring C.B. arose from a 1930 cross between Juliana and Vilmorin 23. A description is given of the selection during the season 1934–1940 of various pure lines and of yields of some of these.

During recent years the stock seed of this variety has been a mixture of five lines. Since 1940 a further selection from the original seed has been made. One line has been found to produce straw at least 4 inches longer than usual and also to yield best on the poorest land. The results have shown the value of wide research into pure lines of a new variety. Although most of these lines resemble each other closely in many respects, nevertheless there is always the possibility that one, e.g. because of better tillering, may outyield the rest. With the variety Staring this research has resulted in raising the yield by probably 7%.

In future each year a selection of 20 pure lines, probably from 887–40103, will be grown and, provided that during two years no divergent line is found, they will be thoroughly mixed together as grower's seed in order to avoid loosing the high yield attained. Each year attention will be paid to disease resistance and other characters in addition to yield.

*Gerstproblemen.* (*Barley problems*). (*pp.* 5–6).

Lago barley is very susceptible to yellow rust. The only selections that are promising are lines selected from crosses of Maja x Mansholts two-row, Kenia x Georgine, and Kenia x Spratt Archer. The first two are stiff varieties of the Kenia type.

The breeding of a variety having the good qualities of Kenia (fairly stiff straw, high potential yield and good brewing quality) combined with resistance to rust, smut, mildew, and leaf stripe, as well as having smooth awns is a practical possibility.

For smut resistance low yielding Japanese and Asiatic barleys have been crossed and backcrossed repeatedly with Kenia. Bigo barley and an Asiatic variety are fully resistant to yellow rust and fairly resistant to dwarf (brown) rust. These also have been repeatedly crossed with Kenia, as have a smooth-awned variety and varieties resistant to leaf stripe and mildew.

*Twee nieuwe, witzadige C.B.—Haverrassen.* (*Two new white grained C.B. oat varieties*). (*pp.* 6–9).

All crosses made in 1937 involved the yellow-grained Flämingsgold as one of the parents. Two varieties have been sent in for inclusion in the variety list: Libertas C.B. (Dippe's Early White x Flämingsgold) and Pax C.B. (Flämingsgold x Binder). The former comes into ear five and the latter three days earlier than Adelaar, and both have good strong straw that ripens simultaneously with the grain. As regards yield the varieties are a great advance, quality, as determined by the bushel weight, is clearly better, and the grain colour is somewhat better as are also the fullness and size of grain.

*Mais.* (*Maize*). (*pp. 8–9*).

Although a cob bears many grains there have never been enough to carry out yield trials and attempts to multiply the seedlings vegetatively, as with rye, have failed to increase the quantity of seed obtained. Recourse had therefore to be made to wide planting, heavy manuring and extra care. It is probable that 30 by 30 inches is the optimum for seed production.

Heterosis has been receiving attention and a large number of different lines that have been inbred for three-years from Vroege Gell Rond [Early Yellow Round] and of various other early varieties are available, and experimental crossing of these will be undertaken.

*Resultaten der Erwtenveredeling.* (*Results of pea breeding*). (*pp. 9–13*).

This work started in 1921 with a cross between Mansholt's short strawed marrow-fat and Krombeck, a yellow, round, long strawed garden pea, which gave rise to the very high yielding Zelka, which was inscribed in the variety list in 1932 and has become the most generally cultivated marrow-fat in Holland. Although initially the work was devoted entirely to improving marrow-fats, since 1930 small green peas have been included and a few years later also Capucines.

For marrow-fats efforts are being made to breed a variety that will compete with Zelka but which will also have a higher 1000 grain weight, as well as all the other desirable qualities. Jumboka which was inscribed in 1935 is generally satisfactory but will not compare with Zelka in yield, and was therefore dropped in 1943. A table of the yields, size, 1000 grain weight, and percentage of broken peas of a number of promising selections is given.

A table of yield figures of a number of new selections of small green peas over up to 7 years proves the existence of many promising new varieties of small green peas. The three registered varieties Rondo, Parel and Stijfstroo [Stiff Straw] are somewhat resistant to the form of collar sickness that commonly occurs in the south and west of Holland; Stijfstroo (formerly Erecta) especially resistant and Ronda least. Parel produces a great quantity of haulm and is therefore particularly suited for heavy land.

A table shows the yields for over five years of a number of promising selections of Capucines, practically all of which are offspring of Zelka. Attention is called to the good qualities of several.

*Een nieuwe witte stamboon-Excelsior C.B.* (*A new white variety of haricot-Excelsior C.B.*). (*pp. 13–14*).

This new variety has yielded slightly but consistently more than Witte Stamboon C.B. (White Haricot C.B.) for three years. Amongst other good qualities it is strikingly resistant to *Ascochyta.* It also gives very few broken peas, is resistant to *Colletotrichum* and is less susceptible to halo blight than Witte Stamboon. It is inscribed in the variety list this year. (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1585).

*Voederbietenveredeling.* (*Improvement of mangolds*). (*pp. 14–15*).

Three varieties are under selection, Groenkraag C.B. [Greencollar], Barres C.B. and Voedersuikerbiet C.B. [Fodder mangel C.B.], of which the first is the most important. For seed production of selected families about 20 cuttings are made from one individual, which will yield 500–1000 grm. of seed. The germinated seedlings are vernalized by five to six weeks cold treatment and then put into a greenhouse at 15° C. under long-day conditions provided by neon lamps. The percentage of bolters, which are rapidly detected under these conditions, is thus known for each family, The experimental plots are sown in early April. Only families with a low percentage of bolters are planted out. A description is given of the methods of selection employed. There are 19 varieties inscribed in the variety list 1946 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1585) and a further 47 in the appendix.

*Beknopt overzicht van de veredeling op resistentie bij tarwe.* (*Brief survey of breeding for resistance in wheat*). (*pp.* 15–17).

Resistance to yellow rust is of two kinds: germinating seedling resistance, on which no work has been done recently, largely because of lack of essential equipment, and field resistance. The number of varieties showing the latter has increased considerably. Immune varieties are selected in trial plots so arranged that a rapid and regular spread of rust is obtained.

Varieties resistant to smut are selected in a similar way. In order to be sure of getting immune varieties, those that are not attacked in the field are artificially infected.

On the trial plots, therefore, only varieties immune to yellow rust and smut are tested and here the criterion is sufficient yield. Staring C.B. is a good step in this direction. Although it is completely resistant to the smut that occurs on Juliana, it suffers however from a new form (cf. *Plant Breeding Abstracts,* Vol. XVI, Abst. 1585).

*Veredeling op resistentie bij stamboonen.* (*Breeding for resistance in haricot beans*). (*p.* 17).

All Dutch varieties except Walchersch Witte [Walcheran White] and selections from it, are more or less susceptible to halo blight and in varying degree to *Ascochyta* blotch and virus diseases. Since 1942, 16 varieties have been found that are very resistant to halo blight. Yield trials have shown them inferior to standard varieties.

*Bestrijding der vetvlekkenziekte bij stamboonen.* (*Control of halo blight on haricot beans*). (*pp.* 17–19).

An experiment is described which shows that spraying with copper oxychloride is effective in controlling this disease. Provided good healthy seed is used, three sprayings, the first when the simple leaves have just opened, followed by two others at fortnightly intervals, should be sufficient. To obtain completely healthy seed, removal of sick plants and spraying with copper oxychloride is not sufficient; but entirely healthy pods are chosen, on which the blight spots are easily recognized. This requires much time, as few such pods are found and therefore but little seed. This seed is sown away from the rest, frequently sprayed and kept under constant observation. In this way entirely healthy seed is obtained.

*Het kweeken van* Phytophthora-*resistente aardappelrassen.* (*The breeding of potato varieties resistant to* Phytophthora). (*pp.* 19–23).

All varieties of the cultivated potato (*Solanum tuberosum*) are susceptible. The most important of the other species of *Solanum* that shows complete immunity is *Solanum demissum,* which in Holland blossoms freely, sets many berries, but forms practically no tubers. It is easily crossed with cultivated varieties and the offspring are completely resistant to *Phytophthora.* These plants are fairly uniform and large, with many blue flowers but which set no self-pollinated berries, very many long (up to 2 metres) stolons, and malformed tubers with deep eyes and nearly always white flesh. They show the greatest variation in yield, from absolutely nothing up to 1 kg., depending on the pollen parent: a late variety gives low yield and an early variety high yield. To get rid of the late maturity of the wild potato, early or very early maturing varieties must be used as parents in backcrossing which is the way to get rid of all the undesirable qualities shown by $F_1$ plants. *Phytophthora* resistance is the only character of the wild variety that is required.

The $F_1$ plants are self sterile because the pollen is sterile. Crossed with cultivated varieties they give $F_2$ generations comprising resistant and susceptible plants. The former are selected by infecting the young seedlings in the greenhouse in the following manner. The young seedlings in boxes are thoroughly soaked and sprayed with a suspension of *Phytophthora* spores in water, when they have 2 to 3 leaves. The boxes are covered with sheets of glass in the greenhouse and protected against too high a temperature (19° C. optimum). After a week susceptible plants are completely covered with grey sporophores and are beginning to decay. Resistant plants show only small black spots where the fungus entered. No sporophores are produced. Intermediates are found between these two extremes. Only the resistant plants are retained, potted up, hardened off and planted out in the field after 20th May. These show a very considerable range of variations, such that a good plant is hardly to be expected or to be found. As many as possible are back-crossed with a cultivated variety and the resulting $F_3$ is sown the following year. They are treated as described for the $F_2$, but in the field every effort is made to prevent infection with virus by roguing all sick plants. At the same time any that obviously differ from the desired type are removed. Harvesting is done early to ensure sound seed and a few plants are found that appear to satisfy requirements as regards position and shape of tubers, colour of flesh, etc. This early lifting of the crop excludes the possibility of getting any seed. For this purpose some hundred of the least bad clones of the $F_2$ are planted and crossed with cultivated varieties. Many of these clones are so infected with virus that they hardly appear above ground: many die, but some survive and fail to bloom. After lifting, seed is kept of the best clones, i.e. those having yellow flesh, reasonable yields, no shoots and short stolons, and well shaped tubers without deep eyes. This is again $F_3$ seed, but most probably of better mother plants on the average than the $F_3$ of the previous year.

Meanwhile a complication occurred—the usual fate of a breeder of resistance. In the autumn of 1945 three cultures of *Phytophthora* were made from varieties that had resisted inoculation. These appeared to be three new biotypes, judged by tests in the following spring, capable of attacking the up-to-then resistant varieties and causing a much higher mortality than usual in the seedling inoculation tests. Luckily a few of the older and some of the new seedlings are resistant—thus to five *Phytophthora* strains.

It is expected that after another two back-crosses, i.e. in three or four years, the situation will be reached at which the ordinary breeder starts, i.e. as many good varieties may be expected as would result from crossing two cultivated varieties. Then it will be possible to select in addition to *Phytophthora* resistance, for wart immunity, yield, taste and all the other qualities that a good potato should possess. C. B.

1973. 575:633(51)

**Report of the China-United States Agricultural Mission.**

Rep. Int. Agric. Collab. 1947 : No. 2 : Pp. 265. (Mimeographed).

The findings and recommendations of the joint Chinese and United States Agricultural Mission to China in 1946 are reported under the following main sections: the content of a national agricultural programme; a national system of agricultural credit; national land policy; marketing agricultural products; farm tenancy; education and research; agricultural extension work in China; a national agricultural regulatory service in China; production and marketing statistics; organization of China's agricultural services; international trade; the Chinese tung oil industry; silk industry; tea industry; and the development of China's wool industry. A sub-section refers to the plant breeding work achieved in the past and recommends future objectives. Another sub-section draws attention to the need of a wider distribution of improved seed and planting stocks. The section on the tung oil industry gives information on the climatic requirements of *Aleurites Fordii* and *A. montana*, and refers to the need of a well-planned tung breeding programme.

Appendix B lists (1) the agricultural educational institutions of China, (2) the Ministry of Agriculture and Forestry and affiliated organizations for agricultural improvement, and (3) provincial agricultural improvement institutions.

Appendix D provides excerpts from the Survey of Grasslands of Southwest China, and from the Outline of Research in Forage Crops, Pastures and Range Management, both by O. N. McConkey, of UNRRA. These excerpts summarize the recommendations made, and include reference to breeding, introductions and other aspects of interest to forage crop breeders.

1974. 575:633(54.1)

**Annual Report of the Department of Agriculture, Assam for the year ending 31 March 1946** (1948) : Pp. 292.

In addition to reports of the investigations summarized below, the second annual report of the Plant Collection Section, Jorhat, is given. The collection of seeds and pods from types of the following local crops grown in various parts of Assam is reported: danta (*Amaranthus* *gangeticus* and *A. Blitum*); jhinga (*Luffa acutangula*); bhindi (*Hibiscus esculentus*); brinjal; chilli; red and white mustard; black gram (*Phaseolus mungo* var. *Roxburghii*); peas; lentil (*Ervum Lens*); barley; mung (*Ph. radiatus*); cotton; jute; linseed; *Sesamum*; and maize. Collections of economic plants have also been obtained. Many specimens from the collections of both years have been identified.

The useful glossary of local names for crops and of other terms given in Appendix VIII is a welcome inclusion.

**Wheat**

Pure line selection and a varietal trial were carried out at Kokilamukh farm.

**Barley**

Five promising types are described which have been tested at the Kokilamukh farm.

**Ragi (*Eleusine coracana*).**

Three types were under investigation at the Jorhat farm. Type 10 was late flowering and late maturing; type 2 was the earliest to flower and outyielded the other two; type 1 was the tallest and gave the highest number of tillers per plant and the greatest length of panicle.

**Sorghum**

Different types of jowar are under observation at the Jorhat farm.

**Rice**

Improvement work was continued at the Titabar, Karimganj and Habiganj farms.

At the Karimganj farm pure lines of sail, aus and asra paddy were studied in two groups: (1) the ordinary group where only the purity of the types was observed, and (2) the selected group where, in addition to observations on purity, the yields of 100 plants were recorded with a view to selecting high yielding types for inclusion in the varietal trials. Fixed hybrids were also studied in the ordinary and selected groups.

The cross between the sail types, Latisail and S. 670, is under investigation; the latter is a full purple type. The back-cross between AsC. 777 105 b2 and D. 138 6 is being studied.

Cultural investigations at the Titabar Farm included studies of tillering habit of sail strains, the ratio of grain and straw in sail and asra paddy, and vernalization of aus.

The main object of work at the Habiganj station is the improvement of aman and boro paddies which grow in the low lying tracts of Assam. Pure lines of both types were maintained. Hybridization between aus and boro has failed to give a suitable hybrid strain; some hybrids between sail and boro are being selected for high yield and quality. In addition, it is hoped that crossing between the different groups of boro will result in valuable new strains. Crosses between strains of aman paddy are being studied. Cultural trials included experiments on the flood resistance of promising aman selections, the yield of aus and aman in mixture compared with the yields of aus and aman sown singly on the higher slopes, the response of four recommended aman strains to cultivation at different water levels, and dry versus wet sowing. The proportions of grain, straw and chaff in selected types of aman and boro were analysed.

Work at the Titabar farm is concerned with ahu and sali (or sail) classes of paddy. Both types were studied in ordinary and selected groups. Hybridization within the ahu and sail types is in progress. One of the hybrid types developed at this station, Andrew Sail, has already established its popularity throughout the Assam Valley. The percentage of false grain was found to be higher in ahu than in sail in observations at the Titabar farm. Recommended strains were tested for straw yield; Andrew Sail and Latamaguri produced the highest yields.

Varietal trials carried out at the three above farms, including new strains of the different paddy types, are reported in detail.

Appendix VI gives information on the 46 paddy strains recommended by the Department of Agriculture.

The development of bunt resistant varieties is receiving attention at Sylhet.

**Potato**

Selection trials were carried out at the Upper Shillong farm on hybrid varieties received from the Simla station.

Appendix VI provides notes on the 49 improved varieties recommended as the result of trials at this farm.

**Cotton**

Pure line selection was carried out on long, medium and short staple types at the Jorhat farm. A varietal trial of the following long and medium staple cottons is reported: C.6, C.7, C.17, C.20, C.41 and C.42. A factorial experiment was carried out on the interaction of variety and time of sowing.

**Flax**

Observations were made on different types at the Kokilamukh farm.

***Hibiscus***

Six types of *H. Sabdariffa* var. *ultissima* were studied at the Jorhat farm.

**Rhea (*Boehmeria nivea*)**

This crop is considered to be potentially valuable for Assam.

***Agave***

Plants of *A. cantala* are under observation; in addition to yielding cordage fibre, the leaves give a valuable organic fertilizer.

**Sugar cane**

At the Jorhat farm the new Coimbatore canes, Cos. 623–633, were subjected to observation in the nursery. Co. 623 was the only variety whose juice quality was satisfactory. The varieties are to be further studied. Fourteen varieties, including the standard P.O.J. 2714, were under investigation in the observation plots. The canes Co. 605, Co. 470, Co. 615, Co. 460, Co. 617, Co. 618, Co. 619, Co. 620, Co. 621, Co. 622 and P.O.J. 2714 were chosen from the observation plots for periodical juice analysis.

Varietal trials of Co. canes and P.O.J. 2714 as plant and ratoon canes were carried out.

Appendix VI gives details of the 23 improved varieties recommended as the result of trials at Jorhat station.

**Tobacco**

At the Jorhat farm 44 types were studied.

**Oil seed crops**

Selection on *Sesamum* is being carried out on various types at the Jorhat farm.

Pure line selection of Indian mustard (*Brassica juncea*) is in progress at the Kokilamukh farm. Varietal trials of rape (*B. Napus*) and red types of mustard are reported.

Observations were made on linseed types.

**Fruits**

At the Citrus Fruits Research Station, Burnihat, progress has been achieved in the classification of the *Citrus* fruits indigenous to Assam. Stock-scion investigations are reported. The results so far obtained in an experiment on indigenous rootstocks indicate that Soh Myndong (*Citrus Limonia* Osbeck) from the Khasi hills is the best root-stock for the Khasi orange.

Investigations on the suitability of indigenous rootstocks for the apple, pear, plum and peach are in progress at the Fruit Experiment Station, Shillong. Seed samples of *Pyrus khasiana*, *P. bacata*, *P. pashia*, *P. communis* and *P. Malus* were collected in 1941 from the Khasi and Jaintia hills; the growth rates of the seedlings have shown wide interspecific differences.

**Groundnut**

Different types were studied at the Jorhat farm. Type 14, the highest yielding produced 194·2 lbs. per acre, Type 9, the next highest yielding, 190·6 lbs.

**Peas and beans**

Pure line selection and a varietal trial of matikalai or black gram are reported from the Kokilamukh farm. Different types of mung bean are being studied. Pure line selection and a varietal trial of urid (*Phaseolus Mungo* var. *radiatus*) have been effected. Trials of types of masur or lentil and khesari (*Lathyrus sativus* L.) are reported. Five types of pea were studied.

At the Jorhat farm 14 different types of soya bean were examined.

1975. 575:633(54.8)

**Administration Report of the Agricultural Department, Travancore.** 1947 : Pp. 36.

**Rice**

Improvement work is in progress at the Paddy Breeding Stations at Moncompu and Adoor. Strain No. 1191, selected at the former station from the variety Chettivirippu, yields 30% more than the local seed. It has been multiplied under the name MO. No. 1. The strain is resistant to salt and acid conditions. Strain No. 1229, a selection of Kallada-Samba, yields 22% more than the local seed; it has been multiplied under the designation MO. No. 2. Mass-selected seed of Kallada-Samba has been distributed.

At the Adoor station, yield tests of 40 strains derived from four local varieties were continued. Introduced strains were tested in comparison with local rice. Mass-selected material was distributed.

Types of Russian paddy seed were tested at the Nagercoil Farm.

**Sugar cane**

Trials of introduced varieties were conducted at Alwaye and Kuttur. P.O.J. 2878 and Co. 419 have proved superior to the other varieties tested in yield of cane and raw sugar in tons per acre.

**Groundnut**

A hardy, drought resistant variety (name not given) gave good results.

1976. 575:633(66.4)

**Annual Report of the Department of Agriculture of the Colony and Protectorate of Sierra Leone for the year 1946** (1948) : Pp. 32.

In addition to the introduced varieties mentioned below, crop introductions included the following: various legumes, cassava and raspberry from the Gold Coast, beniseed and onions from Nigeria, sweet potato, East African finger millet, *Indigofera endacophylla*, *Coix Lachryma-Jobi*, *Panicum miliaceum*, *P. miliare*, *Setaria italica*, Russian sunflower and soya bean.

**Rice**

Selection for yield, length and strength of straw, disease resistance, time taken to mature and palatability is being carried out on local and imported upland varieties at Njala. So far three Peruvian strains and the local variety Pa Werike appear to be the most promising.

Varietal testing and selection were continued at the Rokupr Station. Single panicle selection was carried out on the varieties Toma, India-pa-lil, Ngasein, Indo-China, Kavunginpoothala and D.C. 39.

Tests of swamp varieties were conducted at the Makeni Station. Of the varieties from British Guiana, D. 99 gave the highest yield, 59 bushels per acre. The variety is early maturing and should prove popular among local farmers.

Varietal differences in susceptibility to a new disease in Sierre Leone, caused by a species of *Ephelis*, have been observed.

**Grasses**

At Njala the following upland or swamp grasses are under observation: *Pennisetum* spp. *Panicum maximum*, *Panicum laxum*, *Chloris Gayana*, *Cenchrus ciliaris* and *Paspalum dilatatum*. The introductions, *Andropogon Gayanus*, *Pennisetum hordeoides*, *Brachiaria mutica* and two perennial *Pennisetum* spp. were multiplied for trial.

**Sweet potato**

Varieties were tested at Makeni.

**Cassava**

Various types were grown at Rokupr for observation on mosaic resistance. Varieties were also studied in general at Makeni.

**Yam**

A trial of the Nigerian selections Nos 32, 33, 105 and 152, Jaffna King, Chinese, Yellow and the local Port Loko White is reported from the Njala Station.

**Coffee**

Individual bush recording was continued at Njala.

**Ginger**

Line selection of local grey and yellow varieties has been begun at Njala, based upon weight and size of hands.

**Citrus**

Individual tree recording continued at Njala.

**Oil palm**

Individual tree recording was continued at Njala on Deli, Angola and Nigerian stock. The pure line multiplication plot of Angola was rogued for type of fruit. Seeds from trees of the desired type in this stock have been planted.

Plantations of the high yielding Angola oil palm were established at Rokupr and elsewhere. All available seed of both this type and Deli is being collected to provide the basis of improved native-owned plantations.

**Coconut**

Soaking the nuts in water appears to improve their germination. Cutting in any form has been found to retard germination.

1977. 575:633(67.5)

Rapport annuel pour l'exercice 1946. (**Annual report for the year 1946**).

Publ. Inst. Agron. Congo Belge 1948 : Hors Sér. : Pp. 184.

**Pyrethrum**

$F_1$ plants and various clones were tested for productivity. The susceptibility to diseases of the clones more productive than the standard was also noted.

**Maize**

Twelve new varieties have been introduced at Yangambi from Mauritius, U.S.A., Southern Rhodesia and different parts of the Belgian Congo. The progenies from crosses with Turumbu maize underwent selection for earliness.

At the Nioka station lines were tested and selections made. Attempts to increase the earliness of AB 43 are being continued. The rice popcorn, *Zea Mays* var. *everta*, is to be used only for breeding for earliness since its yield is unsatisfactory.

A method of estimating the yields of breeding lines is described. Breeding work has been continued at the Gandajika station and tests carried out. A comparative test of five varieties and lines at Lubarika clearly showed the inferiority of the variety Plata. Lines of Hickory King and Golden Corn are undergoing selection at the Rubona Station. In a comparative test of ten varieties the following were the most productive: Gandajika x Hickory King, Hickory King Rubona, Gandajika 351–391 and Gandajika 102 x 148.

**Sorghum**

The observation of varieties at the Gandajika station has been continued. At the Rubona station, selection has been effected in over 2000 lines derived from 35 varieties, indigenous and introduced. The introduced varieties are less productive than the indigenous ones but are of interest for fodder.

**Rice**

Thirty-five varieties from Ceylon, the United States, British Guiana and Jamaica were introduced. Two Ceylon varieties with long growth periods, as well as various other varieties, have been used as pollen parents in crosses with local ones. Numerous lines have been included in trials. Varieties are being multiplied for a comparative test at the Vuazi station, and a yield test of five varieties has been carried out at the Bambesa station.

***Coix Lacryma-Jobi***

Selection is in progress at Yangambi.

**Potato**

Varietal tests were continued at the Nioka station. In experiments at the Rubona station, Dutch Robyjiu proved the most resistant of the new varieties to blight.

**Sweet potato**

The 65 varieties in the collection at the Yangambi station are to be propagated for a comparative test. At the Nioka station new clones have been developed and the existing ones tested for yield. Seedlings and clones have been tested at the Mulungu-Tshibinda station, and varietal tests have been carried out. In tests at the Rubona station, the best yields after one year of growth were obtained in good soil with American Florida White and in poor soil with Caroline Lea. The selection of mother plants is reported.

**Cotton**

Varietal differences in susceptibility to the mite, *Hemitarsonemus latus* Banks, have been observed, and experiments are being carried out to determine the cause of the differences. At the Bambesa station various lines and families were studied. Hybridization has been carried out in order to increase the fibre yield, and back-crosses have been made in order to transfer *Fusarium* wilt resistance to the economically important élites Stoneville A and O/4. Tests showed that DPL/11A–I, Stoneville 2, BP. 52, Arkansas 17, GAR. 32–580 and 33.587 had good wilt resistance. Selection for resistance to wilt is in progress. Varietal tests have been continued. At the Gandajika station, mass and pedigree selection was carried out. Some hybrids were self-fertilized and further crosses were made. The crosses were aimed at improving fibre length whilst maintaining good productivity. Line A42-452-90-98–881 which has the longest fibre was crossed as male parent with the $F_3$ of a GAR x 1103 hybrid and with Delta Pineland. A collection of foreign varieties, the purity of which is maintained by self-fertilization are under observation, half of them being planted out each year. A collection of wild cottons is also being grown; some of the plants are used as male parents in crosses with Upland after their fibre length has been determined. Comparative tests of different families and selections and some foreign varieties were carried out.

Among the self-fertilized material of line 14/125, which has been selected for stability at Lubarika, a stable progeny has been found. Some $F_3$ hybrids from crosses of line 4 with lines 14/125 and 15/126/127 combine a fibre length of 31 mm. with a ginning out-turn of over 37%. Various crosses have been made in the course of the year.

***Urena lobata***

Selection and testing have been carried out.

***Agave***

Varietal tests and observations on different species were made at the Gimbi station.

**Manioc**

Eighteen varieties were added to the collection at Yangambi. About 1700 crosses were made in 1946 between $F_1$ plants of previous crosses. Comparative tests were carried out. The varietal test at the Nioka station confirmed the superiority as regards productivity of An Pedro and Criolinka. Plants introduced at the Mulungu-Tshibinda station from the Amani station include 26 which are resistant, so far, to mosaic.

At the Gandajika station a study of the collection of varieties is in progress.

Comparative tests conducted in different parts of Ruanda showed that the sweet varieties were to be preferred for poor soils at medium altitudes.

**Tobacco**

*N. Tabacum* is attacked by the caterpillar of a moth resembling *Gnorimoschema operculella* Zell. The variety most resistant to this insect is Connecticut while White Burley is the most susceptible. The selection of resistant varieties is the only practical method of control.

**Coffee**

The productivity of plants of the various progenies at Yangambi has been determined for the purpose of selection. Sixty-three lines have been planted out for a comparative test. The yields of a number of varieties tested at Nioka are tabulated. Varietal tests were effected also at the Mulungu-Tshibinda station where interesting results were obtained from the crosses BM 139 x L 139 and BM 138 x LB 9, and at the Kondo station where the local wild Robusta again proved its superiority. The most productive varieties of Robusta coffee at the Bambesa station were L/120, L/27, L/52, L/51, L/17 amd BP/42. Twenty-two mother trees have been observed here during their second year. The Kenya varieties maintained their superiority in varietal tests at the Rubona station.

**Cacao**

Over 4000 trees are under observation at Yangambi as possible mother trees, and the study of various progenies has been continued. Criollo x Forastero hybrids are under observation at the Kondo station.

**Tung**

Some of the prospective mother trees produced oil with a satisfactory refractive index.

**Oil palm**

Observation of individual trees in the breeding plots is reported. The number of artificial pollinations effected at Yangambi in 1946 was 5247. The yields of various hybrids at the Kondo station were recorded.

***Cinchona***

The observation of mother trees, clones and progenies was continued at the Mulungu-Tshibinda station.

***Hevea***

The average girth measurements of various clones and mean annual yields of the principal clones and clonal families are tabulated. The observation of possible mother trees has been continued.

The extent to which various clones were damaged by wind is also indicated, and data on the development of clones on the various plantations are included.

**Fruit trees**

Varietal tests and observations are reported on the collections at the Keyberg station which comprise peach, apple, plum, apricot, pear and quince trees, vines, citrus fruits and various tropical species.

New introductions have been made.

Varietal tests of citrus fruits were carried out also at Vuazi.

**Groundnut**

Of 17 new varieties introduced at Yangambi during the year, Mazumbika from Southern Rhodesia, Cabri No. 2 from Mauritius and Virginia Bunch from Washington proved particularly interesting.

Experiments with ether to hasten anthesis were ineffective.

The percentage of successful crosses was 34·2%.

New lines from crosses made in 1943–1944 were included in comparative trials.

Selection and comparative tests have been carried out at the Gandajika station.

The varieties A 26 and A 65 proved superior to the other varieties tested in the second year at the Rubona station.

**Banana**

Varieties have been introduced from Buta. Comparative tests of indigenous varieties are to be started. At the Gimbi station, selection for close regular bunches has been undertaken.

***Phaseolus* spp.**

New introductions were made, and selection and comparative tests were carried out. *Ph. mungo* and *Ph. lunatus* proved to be of some interest. At the Nioka station mother plants of *Ph. vulgaris* were introduced and various lines tested. The Mulungu-Tshibinda collection comprises 245 varieties belonging to the species *Ph. vulgaris*, *Ph. lunatus*, *Ph. multiflorus* and *Ph. angularis*.

**Soya bean**

Fifteen varieties from Mauritius, the United States, South Africa, Southern Rhodesia, Jamaica and the Belgian Congo were introduced in 1946. In the 182 crosses which were made 12% success was obtained. Varieties from Oubangi-Chari gave the best results in a comparative test of foreign varieties. Black-grained varieties excelled in a trial of the best varieties from the previous year. Different varieties were tested for yield at the Nioka station, and varieties are being multiplied for a comparative test at the Vuazi station. At the Rubona station the comparative tests continued to show that there was great variability in the productivity of the plants.

1978. 575:633(68.6)

### Annual Report of the Department of Agriculture, Basutoland, for the year ending 30 September, 1947 : Pp. 28.

**Wheat**

Variety trials of Scheepers, Ceres, Thatcher and other wheats were conducted at Maseru and Makhaleng.

Yield and rust resistance form the basis of selection at present. Baking quality is also to receive attention when sufficient material is available for testing purposes.

Selections of crosses between Reward and Talberg are under observation. Two of the better hybrid selections, R/T 7/3 and R/T 19/3, were included in the variety trials, but were unsatisfactory with respect to yield.

**Kaffir corn**

Selection is in progress.

**Pea**

Basuto Yellow proved definitely superior in yield to Black Eyed Susan in a comparative trial.

1979. 575:633(69.82)

### Annual Report of the Department of Agriculture for the year 1946. Mauritius 1947 : Pp. 52.

In addition to the investigations summarized below, varietal trials of groundnut, cowpea, sweet potato, yam and soya bean are briefly reported.

**Fibre plants**

*Agave sisalana*, *A. amaniensis* and *Furcraea gigantea* are under field trial.

**Sugar cane**

The three newly released varieties, M. 165/38, M. 63/39 and M. 76/39, showed widespread chlorotic streak infection.

Chlorotic streak was again found to be an important factor in the failure of sett germination.

**Tobacco**

A spacing and variety trial of Bonanza, Jamaica Wrapper and White Mammoth was carried out at the Tobacco Research Station. A trial of Bonanza and Amarello in comparison with the hybrid Bonanza x Amarello is also reported; Amarello and the hybrid were equal in yield, but gave significantly higher yields than Bonanza; the grade index of the flue cured leaf of the hybrid was better than that of Amarello, the grade index of both being better than that of Bonanza.

Tests were carried out on introductions of Bonanza, Jamaica Wrapper and other varieties from Canada, Southern Rhodesia and India. None of the introduced varieties was found superior to the local ones in disease resistance or other characters, but further trials are to be carried out.

Selection of varieties which have proved adapted to local conditions, such as Amarello and Bonanza, was continued.

The cross Bonanza x Amarello was repeated, in both directions.

The black shank resistant air curing variety Rg, introduced from the U.S.A. in 1945, has been used in crosses with Amarello, Bonanza, Jamaica Wrapper, Virginia Bright, White Mammoth, Yellow Mammoth and White Stem Orinoco. Preliminary field observations of the hybrids suggest that they are more black shank resistant than any of the parent varieties, with the exception of Rg and Amarello.

**Tomato**

A cross between Marglobe and the Cherry tomato was studied. The yields of fruit per plant were as follows: Marglobe 500 grm., Cherry tomato 385 grm., the $F_1$ hybrid 980 grm. Further generations are to be studied to determine whether the increased yield of the $F_1$ hybrid is the result of heterosis.

1980. 575:633(71.6)

**Report of the Department of Agriculture and Marketing of the Province of Nova Scotia for the year ended November 30, 1947.**
1948 : Pp. 186.

Work of the Nova Scotia Agricultural College included the following:—

**Cereals**

Trials of oats and barley varieties are reported.

**Apple**

Data have been obtained on the dates of full bloom and fruit maturity of Northern Spy and other varieties.

**Tomato**

The commercial production of $F_1$ hybrid tomato seed is being investigated. The results suggest that the possible increases in the early marketable crop and total marketable crop, obtainable from $F_1$ hybrid seed, would make the production of such seed worth while on a commercial scale. It is thought the increased yields secured would outweigh the additional cost of $F_1$ seed production.

1981. 575:633(72.9)

**Annual Report of the Department of Science and Agriculture, Barbados for the year 1946-47** : Pp. 83.

**Maize**

The Barbados, Hawaii and Trinidad types were mass-selected.

**Cotton**

Selection is to be carried out on the varieties B. 4204, B. 4212, B. 4301, B. 4404, B. 4411, B. 4413 and B. 1.

**Sugar cane**

The crosses made during the year under review are listed.

The B.s. 47′ series of seedlings has been subjected to selection in a first year seedling trial. This B.s. series of seedlings has been produced with the object of selecting early maturing or short season types of cane, specially suited to conditions in British Guiana, and for spring planting in Trinidad and Jamaica. Tables give the crosses from which the B. 48′ and B.s 47′ groups of seedlings were obtained. The B. 48′ series of seedlings is due for reaping in 1948. Progress in the selection of seedlings of the series B. 47′, B. 46′, B. 45′, B. 44′, B. 43′ and B. 42′ in second year or third year seedling trials is reported.

The following were included in the select seedling trials conducted on various soils: as plant canes, B. 34104, B. 37161, B. 4098, B. 40105, B. 41211 and B. 41227; as first ratoons, B. 34104, B. 37161, B. 4098, B. 41211 and B. 41227; and as second ratoons B. 37161, B. 41211 and B. 1227. As a result of these tests, it has been decided to distribute planting material of B. 41211 and B. 41227 for commercial trial, including tests of millability.

Seedlings of the B. 42′ and B. 43′ series were tested for mosaic resistance by artificial inoculation.

Work on varietal resistance to cane borer continues.

**Tomato**

A small trial was carried out to compare the yield of the standard variety Marglobe with progenies of crosses between the local small tomato with Marglobe and Ponderosa. Several progenies outyielded Marglobe, although the fruit averaged only one-third the size of the fruit from Marglobe.

1982. 575:633(73)

**Report on the Agricultural Experiment Stations, 1946.**
U.S. Dep. Agric., Wash. 1948 : Pp. 126.

The report refers to the following items of particular interest to plant breeders: the new soft red winter wheat Chancellor, bred for cultivation in Georgia (cf. Abst. 1350); the soya bean Hawkeye, suitable for growing in the Corn Belt (cf. Abst. 1295); the soft red winter wheat Vigo, highly resistant to loose smut and mosaic (cf. Abst. 851); a new synthetic red clover, suitable for Indiana; the effect of environmental conditions on the fruiting and shedding of cotton, and on cotton seed and lint properties; the forage barley Feebar, for cultivation in South Dakota; the wheat Seabreeze (cf. Abst. 1511); the rice variety Magnolia (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 616); the hard-seeded Dixie crimson clover (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 613); the peach Bonita; and work on the breeding of winter hardy fruits for Minnesota.

The new synthetic red clover developed in Indiana is composed of three superior selections derived from a productive and summer-enduring "little red clover" by inbreeding, selection, and finally by cross-pollination to maintain maximum vigour. It combines good hay and seed yields, a high degree of winter hardiness, resistance to anthracnose, and some resistance to mildew.

The barley Feebar, bred from the cross Peatland x Vaughn at the South Dakota Station, is a six-rowed, semi-smooth awned variety with stiff straw, dense erect head, and moderately large and plump kernels. It is intermediate between Spartan and Wisconsin Barbless in date of heading, but is more resistant to grasshoppers than either of these varieties.

Additional information on the wheat Seabreeze to that contained in the previous reference in *Plant Breeding Abstracts* (cf. Abst. 1511) is given. The variety was developed from the cross (Mediterranean x Hope) x Gasta.

The new peach Bonita has been developed at the Riverside Station, California, by crossing standard peach varieties, such as Elberta, with a type from Southern China known as the Peento or Saucer peach, and is adapted to mild winters. The new variety shows promise of being valuable not only for southern California but also for all southern areas in the U.S.A. where peach growing has been precarious because of mild winters. The fruit is yellow-fleshed, freestone in type, and suitable for fresh use and domestic canning.

The section of the report on progress in plant disease research gives information on recent investigations into various measures for controlling crop diseases; mention in some cases is made of selection and breeding for resistance, e.g. tobacco breeding for resistance to *Thielaviopsis basicola*.

1983. 575:633(74.2)

**Agricultural research in New Hampshire.**
Bull. N.H. Agric. Exp. Sta. 1946 : No. 367 : Pp. 55.

**Cereals**

Variety trials of oats, spring wheat, barley and maize are briefly reported.

**Forage crops**

Selection is being carried out on Ladino clover, red clover and timothy. A late hay strain of timothy and a shorter strawed but leafy strain intended for pasture are under field trial at various locations in New Hampshire. Improvement of Ladino clover is also being effected by breeding.

The possibilities of seed production of Ladino clover, red clover and timothy are being explored. The preliminary estimate of the acre yield of the three seed crops are, 50 lbs., 100 lbs. and 140 lbs. respectively.

**Potato**

The variety Mohawk has been introduced (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1275). It is hoped that it will serve as a substitute for Green Mountain which is susceptible to net necrosis.

**Tree fruits**

Tests of apple, cherry, pear, plum and grape varieties are mentioned; information is given on hardiness. The new apple variety Medina shows promise. Tested at Durham, it has matured early and produced larger apples than Delicious; it has stored unusually well.

**Blueberry**

Selections of the low bush type were transplanted into the cultivated fields of the high bush type and used for cross-pollination with the hope of crossing the two types.

**Strawberry**

Hybrids of cultivated varieties previously selected for late maturity, fruit quality, vigour and disease resistance were crossed in the greenhouse. Crosses were also made in the greenhouse between these types and selections from hybrids between cultivated and native wild types. During the summer the latest maturing hybrid selected from the previous crosses was crossed with Borden, a late blossoming Canadian variety.

**Cucurbits**

An early high quality variety resembling Honey Rock has been released for trial under the name Granite State. The variety has imperfect flowers. Further selection for varieties with perfect flowers and fruit of high quality is being carried out; new crosses between perfect-flowered plants and Granite State have been made.

A new winter squash whose fruits resemble those of Buttercup has been distributed for testing under the name Bush Buttercup; the variety sets its fruits close to the crown, resembling the bush summer squash.

**Tomato**

Progress in the development of satisfactory early tomatoes with a high vitamin C content is reported. Selections are now available in which the fruit approaches marketable size, with a vitamin content of over 50 mgm. per 100 grm. in the summer months.

1984. 575:633(75.1)

**Annual Report of the Director of the University of Delaware Agricultural Experiment Station for the fiscal year ending June 30, 1946** (1947) : Bull. No. 263 : Pp. 51.

**Wheat**

Yields of different selections in 1946 are given.

**Oats**

Yield data for winter oat varieties are reported.

**Maize**

Notes are presented of the performance of hybrids including silage types.

**Beet**

Beets were selected for high sugar content and good flesh colour. They are to form the basis of a better strain of round, sweet, long-season table beets.

**Potato**

In a test of eight late varieties, Sequoia and Sebago were the highest yielding.

**Sweet potato**

Of six strains tested for yield against a strain of Porto Rico, only one surpassed the latter.

**Apple**

Twenty varieties were tested in 1944 and 13 in 1945 for tolerance to methyl bromide fumigation. Wealthy, McIntosh, Delicious, York, Grimes and Orleans appeared to be most susceptible to injury while Cortland, Jonathan, Starking, Blaxtayman, Rome, Gallia Beauty, Lily of Kent, Stark, Paragon, Gano, Winesap and Nero remained uninjured.

**Peach**

Of 32 varieties, the most suitable for freezing were Erly-Red-Fre, White Hale, J. H. Hale, Triogem, Eclipse, Kalhaven, Early Elberta, Delex 1, Elberta, and Summercrest.

**Strawberry**

Seedlings resistant to red stele have been selected from among 1000 seedlings of the varieties Aberdeen and Pathfinder. Four of the Aberdeen seedlings, 9A, 207A, 484A and 550A, show considerable promise and are being compared with Catskill, Blakemore and Temple in a commercial test on Pocomoke loam. Other resistant strains are being tested experimentally on Pocomoke loam and Sassafras loam.

**Cantaloupe**

Jumbo Hale's Best was the best of 11 varieties tested.

**Water-melon**

Yield data for eight varieties are tabulated. Missouri Wilt Resistant produced the largest number of marketable melons per acre.

**Tomato**
In the varietal trials the most productive was Wasatch Beauty, Stokesdale and Valiant came next. Rutgers was still the best all-round canning variety.

**Soya bean**
Yield tests of yellow-seeded varieties and selections are reported.
In varietal tests conducted by the Agronomy Department in Delaware, Wilson Black appeared to be the variety least susceptible to bacterial blight.

**Sweet corn**
Two yellow hybrids, Tristate and Tendermost were outstanding in the tests which were carried out. Of the white hybrids, Silver Cross Evergreen and Silver Cross Narrowgrain receive special mention.

1985. 575:633(75.1)

**Annual Report of the Director of the University of Delaware Agricultural Experiment Station for the fiscal year ending June 30, 1947** (1948) : Bull. No. 271 : Pp. 42.

**Wheat**
Selection No. 4365 is to be increased for limited distribution. It has outyielded Nittany, Red Rock and other varieties.

**Sugar beet**
Breeding is in progress.

**Strawberry**
The red stele resistant selections, 9A, 207A, 484A, 550A and 553A, have been distributed to commercial growers for trial.

**Tomato**
The effect upon germination of grafting tomato scions on to *Datura Stramonium* is being investigated.

1986. 575:633(75.7)

**59th Annual Report of the South Carolina Experiment Station of Clemson Agricultural College for the year ended June 30, 1946** (1947) : Pp. 178.

**Cereals**
Varietal tests of wheat, barley, oats and maize are reported.

**Potato**
Trials of commercial varieties, recently introduced ones and new seedlings are reported. Some of the seedlings appeared very promising as regards productivity and are to be included in tests on a larger scale.

**Sweet potato**
The carotene and ascorbic acid contents of seven sweet potato varieties at harvest, after curing and after four months' storage are given. Hybridization has been carried out with the aim of developing a variety equal to Porto Rico in keeping and table quality, but with improved flesh colour and productivity, uniformity of size and shape and resistance to diseases, especially internal cork and *Fusarium* wilt. About 1200 seedlings from these crosses and from the Louisiana Experiment Station were grown for observation in 1946.

**Cotton**
The results of varietal tests are tabulated.
Breeding was continued for earlier, more productive sea island cotton sufficiently resistant to boll weevil, and for cottons with longer, stronger fibres which are as productive as standard types with a 1¼ inch fibre. Tangüis, Egyptian, sea island and wild types from Florida were used in crosses.
Sealand 542 is one of the best long staple varieties which have been obtained. It was selected in 1943 from the third generation from the fourth back-cross of Bleak Hall (sea island) x Coker-Wilds on Coker-Wilds. The characteristics of the two original parents are indicated and the history of the development of Sealand 542 is described in detail. This

strain has very strong fibre and good staple. It was productive in 1943, 1944, 1945 and 1946 and was to be included in varietal tests in 1947.

In tests of sea island strains, conducted on Johns Island in 1946, the hybrid YR and Seaberry each yielded 1275 pounds of seed cotton per acre, Seaberry being the earlier of the two. Conga yielded 1213 pounds, Mondis 1173 pounds and Seabrook 972 pounds per acre. In the Leesburg tests Mondis was the highest yielding with 1747 pounds per acre, while Conga gave 1631, Seaberry 1560, Seabrook 12B2 (control) 1467 and YR 1380 pounds per acre.

**Tobacco**

A breeding project is being carried out jointly by the South Carolina Experiment Station and the Division of Tobacco, Medicinal and Special Crops of the Bureau of Plant Industry, in order to develop strains of flue-cured tobacco resistant to root knot and meadow nematodes, and strains with combined resistance to the more common tobacco diseases. Progress towards the accomplishment of both these objectives is reported.

The results are presented of tests of the effect of different amounts of fertilizer on the yield of Gold Dollar, Yellow Mammoth and the newer varieties 400 and 401. These last two varieties will tolerate higher levels of fertilization and produce higher values per acre without as great a decrease in quality as occurs in the older varieties.

**Peach**

Carotenoid contents and vitamin C content before and after freezing are tabulated for 15 peach varieties. The harvest dates and yields in South Carolina are recorded for seven varieties.

**Blueberry**

Observations have been made on various blueberry hybrids and selections. Vigorous, productive plants with blue fruits of minimum seediness and high quality have been selected for propagation and testing on a larger scale.

**Cantaloupe**

Crosses were made for the purpose of producing varieties resistant to downy mildew and adapted to south-eastern conditions. Twenty-two $F_1$ families were grown under observation in 1946. Some plants were selfed and the $F_2$ seed kept for the next season.

The commercial variety V–1 was selfed in the greenhouse and then again in the field in order to improve its uniformity.

An $F_2$ progeny from a cross between Smith's Perfect, which is resistant to aphids and mildew, and V–1, which is susceptible to aphids and mildew, segregated for aphid resistance. There were 158 resistant plants to 63 susceptible ones, which is in agreement with a single Mendelian factor (cf. *Plant Breeding Abstracts* Vol. XVI, Abst. 1201). The progeny showed various degrees of resistance to mildew, about one-eighth of the plants being highly resistant and a quarter showing some resistance. There was apparently no anthracnose resistance.

The most promising family lines from the 1946 breeding work appeared to be (1) crosses of V–1 x Texas No. 1 because of their vigour, resistance to mildew and the appearance and quality of the fruits, (2) crosses of Seed Breeders and Texas No. 1 for their mildew resistance, yield and appearance and quality of the fruits, (3) crosses of Smith's Perfect with V–1 and Seed Breeders because of their mildew resistance, vigour and high quality, and (4) crosses of Honey Dew with Early Hackensack which combine the flavour and quality of Honey Dew with earliness nearly equal to that of Early Hackensack.

**Cucumber**

In yield tests of the leading varieties of cucumbers and some of the more promising mildew resistant breeding lines, all the mildew resistant lines produced significantly more marketable cucumbers than any commercial variety except Burpee Hybrid.

Trials of pickle varieties and of breeding stocks developed by the Associated Seed Growers are reported.

**Tomato**

A brief account is given of tomato breeding since 1941. The yields of some selections made in 1946 are compared with those of commercial varieties. The performance of the Truck

Station lines is also reported on. They are not yet completely uniform and lack the derived resistance to wilt and to the various leaf spots, but they may serve to replace Rutgers, which they all outyielded, until such time as more desirable types have been produced by further crossing.

**Snap bean**
A breeding project for the development of a productive, round-podded, high quality bean resistant to powdery mildew, greasy pod and common bean mosaic has been in progress since 1943. The yields of five of the more promising breeding lines and of a number of other varieties are reported. The new variety, Logan, proved resistant to the bean viruses prevalent in the area, and set pods well in hot weather. Cherokee Wax is one of the most productive beans tested at the Truck Experiment Station. It is tolerant to the greasy pod virus but susceptible to common bean mosaic. The five breeding lines referred to are resistant to powdery mildew, greasy pod and common bean mosaic.

**Lima bean**
Varietal tests are reported.

**Cowpea**
Varieties which proved susceptible to *Fusarium* wilt were Groit, Honolulu, Dixie Queen, Early Era, Thin-shelled Purple Hull, Improved Bush Conch, Sumptuous and Chinese Red. The highest yielding varieties in a test at Clemson were Nematode Resistant Conch, Cream Crowder, Brown Sugar Crowder, Catjang, Alabama Crowder, Red Speckled, Blue Goose and Unknown. Dixie Queen Browneye, Red Speckled, Nematode Resistant Conch, Jackson Purple Hull, Extra Early Blackeye, Brown Crowder, Catjang, Alabama Crowder and Blue Goose had low curculio infection. Varieties which grew and fruited well and those with a high mortality are listed.

**Soya bean**
Different varieties were tested for yield and content of oil and protein.

**Sweet corn**
Varieties were tested for ear length, ear size and worm damage. The new hybrid varieties Tri-State and Erie proved to be of very high quality.

1987. 575:633(76.3)

**Research in agriculture 1945-1946.**
Rep. Agric. Exp. Sta. La and Agric. Mech. Coll. Baton Rouge, La 1946 : Pp. 124.

**Maize**
Hybrid production is reported.

**Rice**
At the Rice Experiment Station, Crowley, breeding work aims at the development of improved early, mid-season and late maturing medium and long grained varieties. Disease resistance, suitability for combining and drying, high yield and good quality are the chief characteristics desired. Selections of the Rexoro type resistant to all known races of *Cercospora* leaf spot are under test and multiplication. The new varieties Magnolia (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 616) and Bluebonnet (cf. Abst. 1351) are giving good results.

**Dallis grass**
The development of strains producing good yields of both seed and forage is being attempted by selection of native stocks.

**Leguminous forage crops**
Breeding of white clover, red clover and lespedeza was begun in 1945. Native stocks of these legumes have been subjected to selection.

**Potato**
Breeding work attempting to combine resistance to scab, early blight and other diseases with high yield and good cooking quality is being carried out in co-operation with the United States Department of Agriculture.

**Sweet potato**

Data have been obtained indicating that linkage exists between the genes for high carotene content and high moisture content.

Grafting on flowering seedlings resulted in the production of flowers and seed by the grafted plants; a method of forcing certain varieties into bloom, such as Yellow Jersey, is therefore provided.

**Cotton**

Breeding is being carried out in co-operation with the United States Department of Agriculture to develop by back-crossing and selection wilt resistant lines that are high yielding and possess good fibre and other commercial properties. Coker 100, Deltapine 6, Delfos 425 and 6102, Stoneville 2B, Dixie Triumph, Half and Half, and Cook are included in this work.

**Sugar cane**

In inoculation tests of reaction to *Physalospora* red rot, C.P. 36/13 was rated as very resistant, and C.P. 36/105, C.P. 29/116 and C.P. 29/120 as resistant.

The following new varieties were planted for test at the different experimental centres: C.P. 43–13, C.P. 44–51, C.P. 44–69, C.P. 44–72, C.P. 44–101, C.P. 44–153 and C.P. 44–155. Several promising unreleased varieties are mentioned, e.g. C.P. 36–183, C.P. 34–92 and C.P. 36–178.

The variety C.P. 36–13 was released for commercial cultivation in 1946 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1812). It should prove a good yielder on most types of fertile soil. In sucrose content and millability it has proved satisfactory. C.P. 36–13 is one of the most disease resistant canes so far released.

**Capsicum**

In growers' trials the new pepper variety Dixie Wonder has continued to give good results. Other promising strains are being increased for testing at the Fruit and Truck Experiment Station, Hammond.

**Tree fruits**

Pear, plum and fig varieties are under trial.

**Dewberry**

Seedlings have been obtained from wild selections of the dewberry, blackberry and dewberry-blackberry hybrid. They have been planted in the field, together with other *Rubus* material.

**Blueberry**

Selections obtained from crosses at the Southeast Louisiana Experiment Station, Franklinton, are being propagated for increase and testing; they show improvement over the named varieties of the rabbit-eye blueberries tested at the station.

**Strawberry**

The seedling L 39 has been distributed under the name Marion Bell (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1039).

***Brassica***

The collard is the only member of the cabbage family that can be planted in spring and withstand the heat and drought of the mid-south in the United States, to produce a crop in the autumn and winter. For this reason cauliflower and broccoli have been crossed with the collard. The $F_1$ of crosses between the collard and cauliflower resembles the latter in plant characters. The $F_1$ hybrids between the collard and broccoli are somewhat intermediate, but largely resemble broccoli. Both crosses showed considerable hybrid vigour. Selections from the $F_1$ generations will be back-crossed to each parent, and also intercrossed and selfed. The $F_1$ hybrids were much hardier than broccoli or cauliflower. The heads of the cauliflower hybrids were more compact, and many of the heads were enclosed in wrapping leaves, resembling a head of a cabbage.

**Water-melon**

Strains combining *Fusarium* wilt resistance and good commercial characters are being developed at the Calhoun substation.

**Tomato**

Breeding for *Fusarium* wilt resistance and individual plant selection for plant habit and fruit production were carried out.

In the yield trial of standard and recently developed tomatoes the following gave good results: the early variety, Louisiana Gulf State Market; Dixie, a pink fleshed variety bearing over a long period in both spring and autumn; seedling 6 1 1, which sets fruit at higher temperatures than any other variety tested; Hybrid 170 and Hybrid 187, red-fleshed canning types; and Marglobe-Louisiana Slicer (Pink).

**Okra**

The round-podded varieties Louisiana Green Velvet, Dwarf Green Velvet and French Market are recommended as an oil seed crop. Seedling H.S., a dwarf selection of Louisiana Green Velvet, shows promise as a variety for oil production, and will probably be recommended for cultivation when sufficient seed is available.

**Cowpea**

Selections from crosses made in 1941 show promising wilt and nematode resistance at the Calhoun substation. Particular mention is made of selection L 35 from the cross Early Clay x Speckle Crowder; in addition to promising resistance to wilt and nematode, it is early and of good quality as an edible cowpea.

**Soya bean**

Later maturing varieties have been found to be more satisfactory than the earlier maturing, so-called seed varieties. The late maturing varieties Acadian, L.Z. and Pelican have been recently released. They give good yields of yellow seed with high oil and protein content, or of forage. The seed does not shatter. These varieties have equalled or exceeded in yield of seed and forage the variety Avoyelles, which has been the leading variety in Louisiana for some years.

Breeding work to produce new strains has been carried out. Selection 85897, and Nanksey, a variety derived from an introduction from Nanking, show promise as seed varieties of medium early maturity. The variety Louisiana Green is promising as a soya bean for forage.

1988. 575:633(76.6)

**Oklahoma crops and soils 1947. Research reported at the second annual Oklahoma crops and soils conference.**

Bull. Okla. Agric. Exp. Sta. 1948 : No. B-319 : Pp. 157.

*Schlehuber, A. A.* (*The small grain program in Oklahoma*). (*pp. 35–41*).

Objectives in winter wheat breeding include: high yielding capacity, good test weight, desirable appearance of the grain, and superior milling and baking properties; drought resistance; resistance to leaf rust and other diseases; a range of maturity dates to increase the harvest season; resistance to lodging, shattering and insects; and winter hardiness.

Varieties of hard red winter wheat at present recommended for growing in Oklahoma are Cheyenne, Comanche, Pawnee, Tenmarq and Turkey (Kharkof). Races of leaf rust to which Pawnee (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1200) is susceptible are on the increase.

Work on resistance of wheat varieties to greenbug has been begun. Pawnee is highly susceptible to this insect.

Oat varieties recommended for autumn sowing in Oklahoma are Wintok, Tennex, Torkedeer and Stanton strain 1; recommended spring sown varieties include Kanota, Fulton, Red Rustproof and New Nortex. Breeding work aims at improvements in winter hardiness, resistance to leaf rust and smut, lodging and greenbug.

In barley breeding attention is being given to increased yield, high test weight and desirable appearance of the grain, winter hardiness, and resistance to diseases, chinch bug, greenbug, drought, lodging and shattering.

*Locke, L. F.* (*The Chinese jujube: a promising fruit tree for the Southwest*). (*pp. 78-81*).

An account is given of *Zizyphus Jujuba.* Trials in Oklahoma and elsewhere have shown that the species is a promising fruit tree for the southern States.

*Jones, M. D.* (*Pollen dissemination by grasses*). *pp. 118-23*).

Investigations carried out at Lincoln, Nebraska, on the pollination cycles and pollen dispersal of brome grass, buffalo grass and various other grasses are reported (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1663).

*Harlan, J. R.* (*Tucson side-oats grama: an improved strain*). (*pp. 123-25*).

Tuscon side-oats grama is a vigorous high yielding strain developed at the U.S. Southern Great Plains Field Station, Woodward, Oklahoma. The original material was collected in Arizona. The bulk source was grown at the Soil Conservation Service nursery, Tuscon, Arizona, under the number A 2405. Material was sent to the Woodward station where selection for winter hardiness was achieved. Tuscon side-oats grama begins growth earlier and remains green later in the autumn than other strains, growing in late summer when other strains are likely to become dormant. The strain has not yet been tested on a full scale or in grazing trials.

The breeding behaviour of the strain and cytological investigations have shown that this strain is apomictic.

The chromosome numbers of individual plants vary from $2n = 85$ to 101. In microsporogenesis and megasporogenesis the first division is asymmetrical.

Four other strains from Tuscon are under observation. The breeding behaviour of one of the strains suggests that it is apomictic; the other three appear to reproduce sexually.

*Savage, D. A.* (*Native sand lovegrass: a new seed and pasture crop for the Great Plains*). (*pp. 126-29*).

Native sand lovegrass has proved to be one of the valuable grasses under trial at the U.S. Southern Great Plains Field Station.

1989. 575:633(77.2)

**Sixtieth Annual Report of the Director of the Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1947** : Pp. 128.

**Wheat**

The new soft red winter wheat Vigo is described (cf. Abst. 851).

The varieties Goens and Wabash have been crossed with Fairfield with a view to breeding wheats with improved test weight.

The barley pearler has been adapted as an instrument for testing quality. This method is useful to the breeder for estimating hardness in early generations.

**Oats**

Spring oats breeding is described. Promising strains were selected some years ago from crosses between the variety Cartier, which possesses high quality, and C.I. 2570, a mid-season smut resistant oat. These strains were crossed with Bond, which has good straw strength and resistance to smut and crown rust. Selections from this set of crosses have now been crossed with Clinton (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1308).

**Maize**

Three new yellow hybrids have been approved for commercial double cross seed production: the early maturing hybrid Indiana 251A (WF9 × M14) × (187-2 × L289) for northern Indiana; Indiana 605A (WF9 × 38-11) × (187-2 × 07), a hybrid with medium maturity suitable for central Indiana; and Indiana 816A (WF9 × P8) × (Hy × L317), a late maturing hybrid for southern Indiana. The inbred line P8, used in the parentage of Indiana 816A, has been released and will probably be used in other hybrids. It has been developed from a strain of Reid Yellow Dent, and transmits to its hybrids good yielding and rooting capacity and a high degree of resistance to the European corn borer, but susceptibility to ear rots and ear worm.

Breeding for resistance to *Helminthosporium turcicum* and *H. Maydis* is reported.

Experiments on inoculation techniques for determining the resistance of inbreds and hybrids to *Diplodia Zeae* suggest that there may be a comparatively wide range in the spore concentration of the inoculum before the differences reflected in the percentages of the disease are significant.

The oil content of different selections and crosses within a strain of white maize possessing high oil content varied from 3·8 to 10·6%. A considerable range of variation in the degree of unsaturation of the oil in this material was also noted.

### Grasses

Bent grass strains show differences in resistance and susceptibility to the herbicide 2, 4-D, which are apparently genetic.

### *Mentha*

Hybrid mints have been selected for resistance to *Verticillium* wilt, leaf rust and mildew in greenhouse and field tests. Tests of oil yield have been carried out on these clones, three of which produced higher oil yields than did the commercial black peppermint, *M. piperita*. A technique was devised for testing wilt resistance. Cuttings rooted in sand were inoculated by dipping the rooted ends in suspensions of *V. albo atrum*; the results from such greenhouse tests agreed with those of field tests. Hybrids of tetraploid peppermint (*M. piperita*) with *M. crispa*, *M. spicata* and *M. arvensis* var. *piperascens* were moderately resistant. *M. rotundifolia* appeared to be unaffected by the disease; *M. gentilis*, *M. crispa* and *M. spicata* showed different degrees of resistance.

The following new crosses were made: (tetraploid peppermint x spearmint) x tetraploid peppermint; (tetraploid peppermint x Japanese mint) x tetraploid peppermint; tetraploid peppermint x *M. crispa*, *M. spicata* and *M. rotundifolia*.

### Tree fruits

Variety trials of peach and other fruits were carried out.

Sources of scab resistance in *Malus* species are under investigation. Hybrid seedlings between certain resistant selections and commercial apple varieties are to be tested for reaction to scab in the greenhouse; resistant selections are to be established in orchards at Urbana and Lafayette.

### Spinach

Pure lines of Old Dominion, Emerald Standing, Hollandia and Nobel are being developed with a view to exploring the commercial possibilities of $F_1$ hybrids.

### Rhubarb

Breeding work is being carried out.

### Tomato

The data from $F_1$ hybrids between Baltimore and other varieties suggest that the use of $F_1$ hybrid seed is a practicable method of obtaining increased yields of canning tomatoes. Methods of producing such seed cheaply and efficiently are under investigation.

Breeding for several desirable characters continues, including resistance to *Fusarium* wilt. *Lycopersicon* species are being used in the attempt to obtain commercial tomatoes with higher carotenoid and vitamin C contents. Breeding lines have been obtained with as much as 600 micrograms of vitamin C per grm. of fresh fruit, and with fruit aproximately one half the size of that of commercial varieties. Yellow-fruited selections have been secured with commercial fruit size and a provitamin A content of 100 micrograms; red-fruited selections have a much lower content, but certain breeding lines show promise of combining red fruit and high provitamin A content.

### *Phaseolus*

Snap and Lima bean breeding is reported. The pole bean variety Lazy Wife (*Ph. vulgaris*) functions well as a pistillate parent in intraspecific and interspecific crosses on account of its ability to retain flowers and pods under different conditions.

Successful interspecific crosses between Lazy Wife and other species, in particular *Ph. multiflorus*, suggest several possibilities in breeding improved varieties of *Ph. vulgaris* and perhaps the Lima bean (*Ph. lunatus*). The hypogeal germination of *Ph. multiflorus* and the bean beetle resistance of *Ph. aureus* are especially valuable characters. The interspecific hybrids so far studied show low fertility, but further selection may improve this character.

**Soya bean**

Breeding continues in co-operation with the U.S. Regional Soybean Laboratory.

The new Hawkeye variety is superior to Richland in yield and oil content (cf. Abst. 1296).

A strain of Patoka is superior to the parent Patoka variety, Chief and Gibson in yield and oil content, and is fairly resistant to lodging; it is being multiplied for release in southern Indiana. It has been shown that the black-seeded mutant of Lincoln is genetically similar to such black-seeded types as Cayuga and Kingma.

**Pea**

Breeding work on canning peas is in progress.

An off type selection of American Wonder is being increased for further testing since it appears to be highly productive, with satisfactory height of haulm, resistance to at least one strain of mosaic and good quality. It has the advantages of late maturity, tightness of the peas in the pod and indeterminate growth. The selection is to be tested for *Fusarium* wilt resistance.

Breeding and selection are being carried out to develop varieties whose seeds are resistant to rotting in cold wet soils.

Specific gravity was found to be of no value as an index of quality. The water content of ripe samples may be a useful index of succulence.

**Sweet corn**

A new yellow hybrid tentatively named Hoosier Bantam shows promise as a canning type. The seed parent is a selection from a cross between Purdue 39 and Illinois Country Gentleman inbred No. 9; Purdue 51B forms the male parent.

**Popcorn**

New yellow double crosses, consisting of combinations between the Supergold foundation single crosses now in use and South American single crosses, are under trial; they compare favourably with Purdue 38 in yield and popping performance.

1990. 575:633(78.9)

**Agricultural research in New Mexico.**

58th Rep. N. Mex. Agric. Exp. Sta. 1946–1947 : Pp. 55.

**Barley**

Interest in barley as a crop for southern New Mexico is increasing, since it provides a relatively high grain yield in a short season, and good pasture in late autumn and early spring. Foundation seed of the variety New Mexico Winter has been increased for distribution; over a period of years this variety has proved equal, and in most cases superior, to other varieties tested. A varietal trial, progeny tests of head selections and tests of winter hardiness of selections obtained from the United States Department of Agriculture were carried out in 1946.

**Lucerne**

A single plant progeny, N.M. 5–62–0, appears to be highly resistant to both aphid attack and bacterial wilt.

**Cotton**

Progress is reported in breeding for resistance to *Verticillium* wilt in Acala.

New strains of Acala have given good results in advanced strain tests as regards yield, staple length and other characters.

**Chilli**

A new project for the improvement of College No. 9 was begun, with a view to developing a strain superior to existing strains in yield, earliness and resistance to wilt (*Fusarium annuum*), and a strain suitable for commercial canning and freezing in the fresh green condition.

**Pecan**

The varieties Western Schley, Onliwon, San Saba Improved, Bradley, John Garner and Success appear to be most suitable for cultivation in southern New Mexico.

**Onion**

Inbreeding has resulted in an improved strain of White Grano. Inbreeding was accomplished by using pollen free flies and by bagging individual heads.

***Phaseolus***

Pinto bean breeding has been carried out. Valuable new strains which give considerably higher yields than the local beans have been secured.

1991. 575:633(79.4)

**Twenty-seventh Annual Report of the Georgia Coastal Plain Experiment Station, Tifton, Georgia 1946-1947** (1947) : Bull. No. 44 : Pp. 50.

**Cereals**

Tests of wheat, oats, rye and barley were carried out.

The standard Rustproof varieties of oats were more resistant to *Helminthosporium* than other varieties. Rustproof 14, selected at the Coastal Plain Station, is gaining in popularity among farmers as a result of this resistance.

Maize hybrid production is reported.

**Forage Grasses**

Breeding and selection of Bermuda grass, Dallis grass, Bahia grass, cattail millet and Sudan grass were continued.

Hybrids between disease resistant selections of Sudan grass and Sweet Sudan (*Plant Breeding Abstracts*, Vol. XIII, Abst. 1261) were selected; promising selections apparently combining the desirable characters of both parents were secured.

Interesting progenies have been obtained from a cross between an introduction of Dallis grass from Uruguay and the selection D–1 developed at the Coastal Plain Station; these are of no immediate economic value but some may prove useful in further breeding.

Bahia grass hybrids with improved cold resistance are under observation.

Coastal Bermuda continues to give a satisfactory performance (cf. Abst. 243). Grazing tests have shown that on the basis of beef production the strain may be twice as productive as common Bermuda grass.

It is hoped to produce superior hybrids of cattail millet. A leafy variety, of a height suitable for the combine seed harvesting, is being developed and will be shortly released.

**Velvet bean**

Varieties and selections are under test for yield and hardiness, as a preliminary to breeding work.

**Kudzu**

Selections show a wide variation in type. Breeding is to be carried out as soon as suitable selections are available.

**Cotton**

The new wilt resistant variety of Upland cotton, Pandora, is to be increased. It is an early variety, and in fibre properties has proved superior to most commercial varieties tested at Tifton. Selected lines showing promising yielding capacity and fibre properties are under observation, many of which will be crossed with Pandora, to effect further improvement in this variety.

Crosses of pure varieties or inbred lines of Upland cotton are under investigation with regard to hybrid vigour.

A new strain of Sea Island cotton, developed from a cross between Puerto Rican and Gaddis Sea Island, has given high yields; its staple length is about 1⅝ inches, and its fibre possesses relatively high tensile strength.

In addition to the production of new Sea Island strains, hybrids between Egyptian and Sea Island are under investigation.

**Tobacco**

Breeding and selection of flue-cured tobacco are in progress.

**Sweet Potato**

Breeding work has been begun to develop a table variety with stem rot resistance and improved quality, and a variety for livestock feed and industrial purposes.

Porto Rico, Ranger, 129655, Nancy Hall and seedlings known to possess resistance are being grown for breeding purposes.

**Peanut**

Selection of hybrids and standard varieties is reported.

**Blueberry**

Hybrid seedlings of the rabbit-eye blueberry are under selection.

1992. 575:633(86)

Informe del Departamento Nacional de Agricultura. (**Report of the National Department of Agriculture**).
Mem. Minist. Econ. Nac., Bogotá 1946 : **2** : Pp. 477.

*Palmira Agricultural Research Station*

**Rice**

The objects of the rice breeding programme are (1) resistance to diseases and pests, (2) a vegetative period less than 160 days, (3) high yields, (4) a suitable plant height, (5) non-shedding, (6) resistance to lodging, (7) a white grain, of superior industrial quality, and (8) good cooking qualities.

An active selection and testing programme is in progress.

**Cotton**

Varietal testing is in progress.

**Sugar cane**

Fourth generation seedlings have been selected for agronomic and industrial qualities and mosaic resistance. Seedlings from third and fourth nobilizations are now being multiplied asexually.

Further selection has reduced the number of green forage types to eight.

The early variety E.P.C. 38 (16) has continued to give high yields of good quality juice.

Seedlings have been raised from the cross P.O.J. 27–25 x C.P. 281.

**Cacao**

Selection work has proceeded under some difficulties.

A study has been made of the insects concerned in pollination. *Frankliniella parvula* and *Wasmannia auropunctata* are mentioned as most important.

**Rubber**

Grafting work with the clones G.V. 21, G.V. 42, G.A. 49 and T. 3 is under way.

**Fruits**

Newly acquired material is being tested and propagated. New stocks have been developed for the propagation of selected mandarins.

Hybrids have been reared of the mandarin varieties Rivero x No. 15 and Rivero x No. 109, of the Wallace pomelo x lime, and of the Wallace grapefruit x the Oneco mandarin.

*Sevilla Agricultural Research Station.*

**Fruits**

Varietal tests of various fruits crops are reported.

*Armero Agricultural Research Station.*

**Maize**

A project is afoot with the ultimate aim of producing double hybrids. Special attention is being given to the improvement of the varieties Cuba Blanca [White Cuba] and Yucatán.

**Cotton**

Efforts are being made to obtain high yielding varieties with a greater proportion of mature fibres, and with resistance to stenosis. Two lines selected from Express del Brasil [Brazil Express] are to be tested.

The following crosses have been made: Tolima 27 x Deltapine No. 12, Tolima 27 x U–A 8–11, U–A 8–11 x Deltapine No. 12, U–A 8–11 x Deltapine No. 14 and U–A 8–11 x Express del Brasil.

Special attention is being paid to the improvement of Deltapine No. 12.

**Roselle**

A heterogeneous collection of this crop has now been sorted out into its components.

**Sesame**

Breeding for local adaptability, earliness, high yield and improved quality is in progress. Attempts to obtain forms resistant to leaf curl are to be made.

Criollo, Chino Cuba and Amarillo have been selected for greater uniformity.

*Medellin Agricultural Research Station.*

**Maize**

Descriptions are given of five locally adapted maize varieties developed in Colombia: C–1, C–2, C–3, C–4 and Rionegro Selection. Work is also in progress on sweet corn.

A large number of inbred lines are being maintained preparatory to a hybrid maize production programme.

Tables are given of the maize lines being maintained.

Experiments to discover whether height of the ear was correlated in any way with yield gave negative results.

Experiments have been made on the combining ability of sib lines derived from varieties C–1 and C–2 respectively.

**French bean**

Varietal tests are reported.

*La Picota Agricultural Research Station.*

**Wheat**

Information is presented on the baking quality of Colombian wheat varieties and hybrid progenies. Tests have also been made on the percentage germination, vegetative period, resistance to rust, height, hectolitre weight, tillering capacity, and yield of selected varieties. The following hybridizations have been effected: 01535 x Roma, 01535 x 0899, 01535 x Borew 4652-D, 01535 x Pusa, Campesino x 0899, Bola x 0899, Balilla x 0899, Enrique Matte x 0899, Garnett Ott 52 x 0899, Garnett Ott x 0899, Linoyán Colorado x 0899, Passa Mahón x 0899, Potensiani x 0899, Quaderma x 0899, and Turkey x 0899. The principal object of this hybridization programme is to obtain high quality, rust resistant wheats adapted to the local conditions.

$F_2$ progenies of the crosses Bola x Svalöf Gylgiav, Bola x Passa Mahón 7760, Bola x Northern Winter, Bola x Sonora, Bola x Manitoba and Bola x Reno have been examined for number of ears per plant.

$F_1$ hybrids involving Thatcher have been obtained.

**Oats**

Details are given on the yield, hectolitre weight, vegetative period, percentage germination, rust resistance, height and tillering capacity of local varieties.

Grains have been obtained of the hybrid combination Verde C.I. 4312 x Red Rust Proof.

**Rye**

The variety Prolific has yielded best at La Picota.

**Barley**

Details are given on the percentage germination, vegetative period, rust resistance, height, tillering capacity and yield of local varieties.

Hybrids involving Heines H.G., Fresia, Escourgeon, Pelada Negra and Club Mariont have been effected.

*Tabis Central Potato Farm.*

**Potato**

Tests are reported of a series of cultivated varieties, hybrids and wild species.

*Urabá Agricultural Research Station.*

**Rubber**

Selection of clones and varieties is proceeding.

1993. 575:633(91.4)

**Report of the Philippine-United States agricultural mission.**
Int. Agric. Collab. Wash. 1947 : No. 3 : Pp. 50.

A report is given of the United States Agricultural Mission sent to the Philippines during 1946. Brief references are included to crop breeding and selection.

1994. Toxopeus, H. J. 575:633(92)

Verslag over de werkzaamheden van het Plantkundig Instituut van het Algemeen Proefstation voor den Landbouw gedurende de periode Maart 1942–15 Augustus 1945. (**Report on the activities of the Botanical Institute of the General Agricultural Experiment Station during the period March 1942—15 August 1945**).
Landbouw 1946 : **10** : 70–75.

During the Japanese occupation work was disrupted, but every effort was made to carry on as much as possible, both by the European and Asiatic staffs.

In conjunction with Boedijn the chromosome numbers of many *Derris* and potato clones were investigated and a rapid method was worked out that allowed at least eight root tip preparations to be made in a day. In *Derris* the somatic chromosome number 22 and 24 were found in the same species. Counts were also made in *Cymbopogon*, *Amorphophallus oncophyllus* and *Ipomoea Batatas.*

***Derris***

Crossing and study of the collection of wild clones and hybrids were continued. Many valuable forms differing markedly from those generally cultivated were found.

**Rice**

L. W. Kuilman found that the degree of resistance of rice varieties to "mentek" depends on the number of hair roots, which in turn depends on the number of lateral roots that show second order branching. Complete reproduction of "mentek" symptoms was obtained in water culture by doubling the concentration of ammonium nitrate in a solution deficient in potash.

**Potatoes**

Species crossing was continued but most of the material is lost.

***Ipomoea***

Preliminary research on possibilities of seedling selection showed that seedlings far exceeding the best in the Moeara collection in quality and quantity of produce can be grown in a short period.

**Cotton**

Investigation into the forms of the most important species, hybridization of indigenous types with good varieties of *Gossypium arboreum* and *G. herbaceum* found in India, and hybridization between species from the Old and New Worlds were carried out, and the chromosomes were doubled with colchicine.

**Kapok**

Previously obtained data regarding inheritance and spontaneous crossing were worked up

***Broussonetia***

Seed setting was studied.

***Hibiscus***

Attempts to cross *H. cannabinus* (Java jute) and *H. Sabdariffa* (roselle) and a general investigation into the possibility of making species crosses in this genus and of doubling the chromosomes were made. Selection was carried out in a large number of new lines of roselle from a $F_5$ of a variety hybrid made by Bolhuis, and an investigation was made into the anatomy, fibre content and bark thickness.

**Ramie**

A preliminary study of the biology of the flower was made with H. van der Meer.

***Cymbopogon***

Embryological research on failure to set seed and a large scale search for seeds in the plumes were made. One seedling was cultivated and efforts were made to hybridize the better setting varieties of wild and cultivated types.

***Aleurites***

Wit's observations on blooming were continued, and *A. montana* x *A. Fordii* hybrids were studied.

***Amorphophallus***

Water colours and sketches were made of new sorts blooming for the first time in Wit's collection of wild forms.

***Strophantus gratus***

Wit's self and cross sterility research was continued.

**Tomato**

Village types resistant to slime sickness were crossed with an edible variety and attention was paid to the very variable content of vitamin C.

1995. 575:633:007(42)

**Dr. G. D. H. Bell**

Nature, Lond. 1948 : **161** : 714–15.

Reference is made to G. D. H. Bell's work on the breeding of barley, field peas, sugar beet, wheat and oats.

1996. 575:633:061.6(48.5)

Sveriges utsädesförening vid sextio år. (**Swedish Seed Association attains its 60th anniversary**).

Försök och Forskning 1946 : **3** : 97–99.

This is a brief account of the development and work of the Association and its various branch and sub-stations as reported at the 60th anniversary celebrations of its foundation.

1997. OBERMAYER, E. 575:633:35(43.91)

A magyar szántóföldi növénytermesztés és növénynemesités kisérletügyi intézményei 1941-ben. (**Hungarian institutes for the service of agricultural crop production and plant breeding in 1941**).

Szemle, Budapest 1942 : **11** : 199–201.

The author gives a general review of all Hungarian state-governed research institutes which co-operate in Hungarian crop production and plant breeding. The order in which the author mentions these are: Institute for Plant Breeding, Mosonmagyaróvár; Institute for Crop production and Plant Breeding, Szeged; Institute for Crop Production and Plant Breeding, Kolozsvár (now in Rumania); Institute for Crop Production and Plant Breeding, Marosvásárhely (now in Rumania); a department of the Hungarian Research Institute in Nagybakta (now in U.S.S.R.); and a department in the Hungarian Research Institute in Ujvidék (now in Yugoslavia). He mentions the following four state-governed plant breeding stations: in Kompolt, Mezöhegyes, Bábolna and Zsuk (now in Rumania); Hungarian Research Institute for Plant Breeding and Genetics, Budapest; Hungarian Research Institute for Cereals and Flours, Budapest; Hemp, Flax and Oil plant Research Institute, Szeged; Research Institute for Tobacco Production, Debrecen; and Hungarian Research Institute for Medical Plants, Budapest. T. P. B.

1998. RIETSEMA, I. 575:633:575.3(47)

Plantenveredeling in de S.S.S.R. (**Plant breeding in the U.S.S.R.**)

Meded. Direct. Tuinbouw 1946 : 319–23, 521–24.

The writer records the impressions made upon a Dutch geneticist and plant breeder of repute by the claims made by various Soviet workers who have adopted Lysenko's views on inheritance and variability and rejected modern genetical theory based on the work of Mendel and Morgan.

In conclusion the writer raises the question of the practical value of some of the "new forms", e.g. tomatoes and peas growing on trees, which are apparently among the aims of Soviet breeders. Much advantage could, he thinks, be derived by an opportunity for Russian and Dutch plant breeders to meet and exchange material and ideas.

1999. Blackman, V. H. 575:633:581.1
**The place of plant physiology in crop research.**
Emp. Cott. Gr. Rev. 1948 : **25** : 91–101.

The importance of physiological investigations in research on crops is discussed, with reference to the experiments carried out by the late F. Crowther in the Sudan and Nile Delta on the physiology of cotton, e.g. the relationship between variety and manurial treatment; physiological, pruning experiments conducted at the Tea Research Institute, Ceylon; investigations on leaf area and leaf efficiency recently made at the Rothamsted Experimental Station; experiment on the control of bolting in onions introduced into England from California, by physiological pre-treatment; and other topics. It is suggested that the work of the plant breeder cannot be carried out satisfactory independently of the physiologist.

## *GENETICS 575.1

2000. 575.1(47)
**(The session of the Lenin Academy of Agricultural Sciences on the position of biological science).**
Pravda 1948 : Nos 217–40.

*Report by Academician T. D. Lysenko on the position of biological science.*
*(Ibid. No. 217 : pp. 2–3; No. 218 : pp. 2–3).*

Genetics is defined as the study of the laws of life and development of plant and animal forms. Darwin's *Origin of Species* is described as the beginning of scientific biology and artificial and natural selection the leading ideas of his theory. Darwin's teaching is of prime importance, the Marxist classics pointed out some of its fallacies. The greatest of his mistakes was the introduction of reactionary Malthusian ideas into his theory of evolution. The error is now being aggravated by reactionary biologists.

Darwin himself had never been able to rid himself of the theoretical errors which he had committed as a result of accepting Malthus' law as valid. Today it is not permissible to concur with the fallacy of the Malthusian over-population law, and the explanation through it of intraspecific struggle. Still less is it permissible to regard Darwin's errors as the corner stones of his teaching, since this would hamper the creative development of scientific Darwinism. In this connexion three Soviet scientists are criticized: I. I. Šmaljgauzen (Schmalhausen), B. M. Zavadovskiĭ and P. M. Žukovskiĭ.

From the outset, the materialist implications of Darwinism have antagonized the adherents of idealism. It has had to be defended against the reactionaries of the Church and of science, e.g. Bateson. The Russian biologists V. O. Kovalevskiĭ, I. I. Mečnikov, I. M. Sečenov and K. A. Timirjazev were among the progressives who defended and developed Darwinism.

In the post-Darwinian era, the majority of biologists have tried to vulgarize and strangle Darwinism, in particular Weismann, Mendel and Morgan.

Weismannism and Morgano-Mendelism are a spearhead directed against the materialist principles of Darwinism. Weismann repudiated the materialist aspects of Darwinism and introduced into biology, idealism and metaphysics.

The materialist theory of evolution of organic life is unthinkable without recognizing that individual differences acquired by organisms in certain environments are hereditary.

Weismann fought not only Lamarck's principle of use and disuse, which is an essential part of the materialist theory of evolution, but also the materialist basis of Darwinism itself.

In rejecting the inheritance of acquired characters, Weismann found it necessary to invent a special hereditary substance in the chromosomes of the nuclei.

After referring to the two opposing ideologies in contemporary biology, Mičurin and Williams are hailed as the founders of Soviet agrobiology.

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* General studies, see also individual crops.

Morgano-Mendelians are criticized for accepting the existence of an hereditary substance in the chromosomes. The neo-Darwinists consider that Mičurin's school of agrobiology, aiming at directed hereditary changes by corresponding changes in the environment is unscientific. The truth of Lamarck's central thesis is affirmed.

The idealistic nature of Morganist genetics is illustrated by quotations from E. Schrödinger's *What is Life.*

Mičurin mastered methods of including desirable hereditary changes according to practical needs. The basic principles of the chromosome theory of inheritance are criticized. N. K. Koljcov is taken to task for asserting that no metabolism occurs during ovogenesis. This conclusion accords with Weismannism. Malinovskiĭ's assertion that Schrödinger's view of the chromosome as an aperiodic crystal was first put forward by Koljcov is regarded with disfavour. This discovery is one in which priority is not creditable.

M. M. Zavodovskiĭ and N. P. Dubinin are criticized for their attachment to Mendelian ideology, and Soviet Morgano-Mendelians in general are censured for the continued use at many universities of text-books on genetics such as that by Sinnott and Dunn. I. I. Šmaljgauzen is criticized at length for asserting that (1) hereditary changes are independent of the environment, (2) induced changes are unpredictable, (3) external influences act only as agents, releasing internal form-creating processes, and (4) mutations occur at random. The theory of stabilizing selection is also condemned, also Šmaljgauzen's interpretations of Darwin's views and his lack of appreciation of Mičurinism.

The universities of Moscow, Leningrad and Harjkov are attacked for the welcome they have given to Šmaljgauzen's views.

To rectify the present position of biological science in Russia, a large number of Mičurinites have been elected to the Lenin Academy of Agricultural Sciences. Morgano-Mendelism is still being widely taught in scientific institutes. Till now, Mičurinites have often been in a minority, as they were in the Lenin Academy of Agricultural Sciences. This situation is being rectified by the direction of the Communist Party, the Government and Stalin personally. A. P. Žebrak and N. P. Dubinin are named as research workers who have obtained results of no practical value.

A general description is given of the principal tenets of Mičurinism (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 117).

P. M. Žukovskiĭ is charged with a desire to strengthen Morgano-Mendelism at the universities.

The author reaffirms his belief that intraspecific competition does not occur (cf. *Plant Breeding Abstracts*, Vol. XVII, 585). He also states that he has succeeded in changing the 28-chromosome species *Triticum durum* into the 42-chromosome species *T. vulgare.*

### *Debate on the report of Academician T. D. Lysenko.*

*Oljšanskiĭ, M. A.* (*Ibid. No. 218 : p. 3*).

"Mičurin's school helps practical breeding and seed growing, whereas Morgano-Mendelism does not, but on the contrary obstructs the work".

Johannsen's theory of constancy of pure lines and the denial by him of hereditary changes in organisms through environmental conditions are rebutted.

Since 1938 seed growers have made the most of Lysenko's methods, utilizing intravarietal hybridization and selection. This has resulted in higher yielding élite seed. Inbreeding is condemned as a "harmful product of formal genetics". Planned guidance of breeding work as advocated by Mičurin has been rejected by formal geneticists, but it has produced practical results.

The following examples are given. The spring wheats Lutescens 1163 and Odesskaja 13 [Odessa 13] and the spring barley Odesskiĭ 14 [Odessa 14] were created by applying Lysenko's principles for the selection of parental plants. Similarly, the cotton Odesskiĭ 1 [Odessa 1], which was obtained by $F_1$ hybrid selection, confirmed the possibility of directed breeding work, provided Mičurin's guidance was followed. The spring barley Pallidum 32 repeatedly sown in autumn has given a winter barley, which is hardier than any winter barley variety available. It eared seven to eight days earlier and emerged five days earlier than the standard winter barley Krasnyĭ Dar [Red Gift].

Among the spring wheats tested at the All-Union Institute of Genetics and Breeding there were varieties obtained by changing spring wheats. These new forms of spring wheat were as high yielding as the better standards, and one of them, Novokrymka 204 [New Crimean 204] was even superior to them. In other properties the new wheats were if anything better than the standards. The winter wheat varieties Hostianum 237 and Ukrainka [Ukrainian] became bunt resistant after they had been changed into spring wheats. The genotypical composition of the new wheats was various. Among the more promising are a line of spring Kooperatorka [Cooperator] which is very early; other lines of Kooperatorka and Ukrainka have vitreous grain similar to that of hard wheat. These examples have shown that directed changes in plant nature are becoming a practical method in breeding work.

Vegetative propagation is also important as a breeding method. Vegetative hybrids obtained from grafting tomato on nightshade were at present being tested in preliminary varietal trials. The hybrids are as early ripening as the earliest tomato varieties. The cropping capacity of the hybrids is greatly superior to that of the early varieties. The hybrids possess an additional valuable economic character in that they are entirely free from shedding. Methods for improving the seed quality of old varieties and methods for breeding new varieties have been suggested by Lysenko. This work is based on the principle of hybridization by means of competitive free pollination. The method is being tried with wheat, maize, rye, sunflower, barley and cotton.

The experiments with winter wheat have given much hybrid material. In 1945, 59,000 grains were collected from open pollination of winter wheat varieties such as Odesskaja 3, Odesskaja 12 and the two commercial varieties Ukrainka and Hostianum 237. $F_1$, $F_2$ and $F_3$ generations of these hybrids are now being studied. The detailed preliminary results led to the following conclusions. The hybrids of all four varieties showed greater vitality and adaptability and yielded more than the plants of the maternal forms, thus showing an improvement upon the best former Ukrainian varieties.

Hybridization work with rye, maize, sunflower and other plants was also described.

*Eĭhfeljd, I. G.* (*Ibid. No. 218 : p. 3*).
[*Eichfeld, I. G.*]

The followers of Mičurin are on the increase, drawing supporters from breeding stations and agricultural institutes. The Russian biologists whose teaching was integrated in the Mičurin school of thought, are the Kovalevskiĭs, Sečenov, Mečnikov, Timirjazev, Williams and Mičurin himself. It is regretted that some Soviet biologists have extolled such reactionary scientists as Weismann, Bateson, Lotsy and Morgan. The Institute of Plant Industry is becoming more Mičurinite regarding its theoretical principles. This has helped to expand agricultural practice to the extreme north, where early crops at the Hibiny Station have been produced and improved. The work of Lysenko on dormancy in plants has facilitated the production of very early potato varieties, which in the south are cropping twice a year. Use has been made of the World Collection of cultivated plants. In all, 170 new plant varieties have been released during the war and in the post-war period. The release of 30 more is expected in 1949.

Speaking of the clash of theoretical ideologies, the author criticizes the Soviet Morganist geneticists in general, especially I. I. Šmaljgauzen. The latter is referred to the work of A. N. Severcov who is said to have established that the sole source of phylogenetic changes was change in the environment, and that it was such changes which determined the evolutionary process. Without that explanation the phenomenon of adaptability is held to be impossible. Severcov is also said to have rejected categorically the assumption of any forces inherent in organisms affecting this development, that were not dependent upon environmental conditions.

*Jakuškin, I. V.* (*Ibid. No. 218 : p. 3*).

In supporting Lysenko, the speaker lists the practical results of Mičurin and his school. The achievements mentioned are hybridization work with apples, pears, cherries, apricots, almonds and peaches, currants having the size of gooseberries, and gooseberries the size of large grapes. Mičurin's methods, applied by Lysenko to vegetable and field crops, have given excellent results. Lysenko is also right in concluding that the best seed comes from high yielding plants on well tilled soil. An example is given of higher yields and improvement in 1000 grain weight of winter wheat grown in the dry year of 1947 in the Kuban, when the fields were protected by afforestation.

Mičurin's genetics are opening up great possibilities. The theory of inheritance of Mičurin and Lysenko is described as a physiological theory. This concurs also with Timirjazev's views. It follows that factors influencing the physiology of an organism are significant in heredity.

The study by N. P. Dubinin of the effect of the Second World War on the structure of the chromosomes of *Drosophila funebris* is described as a "monstrous" deviation from the tasks of a Soviet scientist.

Lysenko's negative attitude to inbreeding methods has sometimes been put forward as an explanation of the delay in building up a stock of superior maize seed in the Soviet Union. In reality, the delay in developing hybrid maize was not caused by the Mičurinites, but by the breeders imitating American methods and demanding more time for preliminary inbreeding work. In 1929, intervarietal crosses with maize of different types and without preliminary inbreeding, yielded significant increases.

Lysenko's work in changing spring wheats into winter wheats and vice versa is most valuable, especially for Siberian conditions.

*Isaev, S. I.* (*Ibid. No. 218 : p. 3.*)

In this speech, Mičurin's "materialist biology" as advocated and developed by Lysenko is supported in somewhat general terms. References are made to Lysenko's theory of phasic development of plant organisms, vernalization methods and summer planting of potatoes in the south of the U.S.S.R.

Vegetative hybridization, which is described as one of the principal features of Mičurin's genetics, is held to constitute the central issue of the struggle between the Mičurinites on the one hand and the Morgano-Mendelians on the other.

A vegetative apple-pear hybrid having pear-shaped fruits, the Renet Bergamotnyĭ [Bergamotte Reinette] is quoted as an example of vegetative hybridization.

*Belenjkiĭ, N. G.* (*Ibid. No. 219 : p. 2*).

Full support for Lysenko is expressed. Darwin and Lamarck are described as infallible. Classical geneticists are dismissed as harmful.

I. M. Sečenov is cited to prove that organisms and their surroundings are inseparable.

Despite all the opportunities that had been offered to the Soviet Morgan-Mendelians, they have failed to breed a single pedigree animal in the past decade. Mičurin's adherents on the other hand have produced several first-rate pedigree stocks, including the highly productive Kastroma cattle.

The entire curriculum should be changed at the universities and agricultural colleges "to open wide the doors to Mičurin's genetics". A textbook on genetics by Rakickiĭ and a book on animal breeding by Davydov are criticized.

The first is described as "reactionary Weismannism"; the second is considered to be "misleading and harmful" on account of its Morganist dogma of inheritance.

*Jakovlev, P. N.* (*Ibid. No. 219 : p. 2*).

The claim is here made that vegetative reproduction is on a par with sexual reproduction in hybridization work. A. P. Žebrak and formal geneticists are asked to consider the following practical results obtained by vegetative hybridization. These are the valuable Mičurin apple varieties Renet Bergamotnyĭ [Bergamotte Reinette] and Kandilj-Kitaĭka [Chinese Candille]; the plums Renklod Ternovyĭ [Sloe Greengage] and Tern Sladkiĭ [Sweet Sloe]; the cherries Krasa Severa [Beauty of the North] and other standard varieties. Mičurin's notable apple variety Beljfler-Kitaĭka [Bellefleur Chinese Crab] was the standard in 44 provinces of the Soviet Union.

Work in many parts of the U.S.S.R. of scientists under the leadership of Lysenko with herbaceous plants has shown the strong effect of stocks on scions and vice versa. The changes induced have been firmly established in the seminal offspring.

As a further example of a vegetative hybridization, Mičurin's Renet Bergamotnyĭ is quoted. This was obtained from working an apple scion on a pear and by crossing the hybrid plant with several southern apple varieties. Some of the hybrid families fruited for the first time in 1946 and 1947. Most of the fruiting trees had inherited characters of Renet Bergamotnyĭ acquired through vegetative hybridization. The accumulated data on the inheritance of characters in seminal offspring of vegetative hybrids has demonstrated the erroneousness of the views expressed by Morgano-Weismannites such as I. I. Šmaljgauzen and N. P. Dubinin.

Vegetative hybrids permit the study of many interesting aspects of physiology. Profound biochemical changes may be induced by the use of mentors.

*Pleseckiĭ, P. F.* (*Ibid. No. 219 : p. 2*).

Mičurin-Lysenko methods are approved.

Several new fruits and soft fruits had been developed at the Ukrainian Scientific Research Institute of Fruit Growing by utilizing environmental action in the hybrid nurseries. Nine of the new varieties so obtained have been released to commercial growers. Some 100 new forms are undergoing state varietal tests. An equal number are undergoing trials at the research station itself.

The following examples of practical application of Mičurin's methods are given:—

The Pervomaĭskaja [May Day] apple hybrid was obtained from crossing Renet Šampanskiĭ [Champagne Reinette] and Renet Landsberga [Landsberg Reinette]. The hybrid was late ripening and very hardy, but its fruit quality was poor. To improve the fruit quality, young Parmen Zimniĭ Zolotoĭ [Winter Golden Pearmain] plants were used as mentors.

In the efforts to spread northwards the cultivation of southern fruits the Institute has developed a peach variety No. 981. Previously its fruit ripened at the end of July, but in 1948 the peach was as early as the earliest peach varieties grown in the extreme south of the Soviet Union, i.e. on 20–23 July. The fruits weigh over 100 grm., are brightly and attractively coloured and have the excellent flavour of the best southern varieties. The original peach seedling that had given the variety was killed by the frost in the winter of 1939 40, but a hardy sloe worked with scions from it did well. In 1948 this plant proved exceedingly productive. The sloe stock brought about great changes in the scion variety. It became hardier, and earlier maturing, while retaining its good flavour.

The Morgano-Mendelian argument that clonal selection as a breeding method is futile is fallacious. Clonal selection is one of the most productive methods for enhancing productivity of vegetatively propagated plants. This is illustrated by the wide range of such varieties as the Antonovkas, Papirovkas and Limonkas. The intervarietal modifications of these forms are of a comparatively recent date, and are due to the effect of varied external influences and to selection of the best plants. At the Ukrainian Scientific Research Institute, clonal selection during the past three to four years has resulted in doubling the yielding capacity of several varieties of black currants.

*Minkevič, I. A.* (*Ibid. No. 219 : p. 2*).

Mičurin's biological principles are affirmed and the following examples of the action of environment upon hereditary characters in flax are given:—

In 1939 in the mountains of Uzbekistan 1-pediculate, 1-capsulate dwarf flax plants were found standing 13–15 cm. from the ground. By sowing the seed of this flax parent for several years in succession on the plantations of the Institute of Oil Crops near Krasnodar, the form was changed into a multipediculate and multicapsulate plant. It is concluded that the hereditary characters of the plant changed as a result of modified environmental conditions. The oil content of the original dwarf plant was 42·7%, but rose to 45·8% when cultivated under the different environmental conditions of the Northern Caucasus. Analyses revealed that these changes were not only due to a change in the testa but to a change in the whole structure of the seed. The results of experiments with the new linseed form, conducted in 1947 in the Odessa province, at the Leninakan Breeding Station and elsewhere, showed that the increased oil content had become a firmly established character.

The other experiment quoted was conducted at the Donskaja Research Breeding Station. A dual purpose flax of the fibre type, variety 806/3, was sown several years in succession from seed obtained each year from the All-Union Flax Institute at Toržok, and from the seed of the same variety produced locally in the Don country. The yield analyses showed that the flax grown from Toržok seed had a 39·3% oil content, while the oil content of the plants produced locally for three years in succession was 40·4%. Flax of the fibre type, when cultivated in the south, undergoes a gradual increase in seed productivity, a higher oil extraction, and a decline in fibre yield. Thus, the dual purpose fibre flax type undergoes a slow process of change to linseed plants of the dual purpose type.

*Nuždin, N. I.* (*Ibid. No. 219 : p. 2*).

Three examples are given supporting Mičurin's teaching: (1) summer planting of potatoes in the south leading to an improvement in degenerate seed potatoes; (2) Lysenko's method of selective fertilization; and (3) vegetative hybridization as applied by such workers as S. S. Kanaš and L. A. Ždanov.

The main issue between formal geneticists and the adherents of Mičurin is the degree of importance attached to the environment as affecting inheritance. While the formalists consider it as capable only of hastening mutation the Mičurin followers believe that it can be used to bring about directed changes. N. P. Dubinin is cited as saying "that Lysenko's method, namely that of trying to obtain adaptively directed changes in plants through the environment is regarded as a wrong and incorrect method". Genetical research has proved the fallacy of this view. Formal geneticists themselves have obtained results which compel them to speak of directed changes brought about through adequate external influences.

*Sisakjan, N. M.* (*Ibid. No. 219 : p. 2*).

Biochemists of the Bah [Bach] Biochemical Institute are said to be sympathetic to Mičurin's ideas. The finding of Lysenko that a close relation exists between changes and inheritance, on the one hand, and the type of metabolism of an organism on the other is particularly valuable. Research at the Institute has established that great changes occur in biochemical activity in organisms after vernalization and after vegetative propagation. Vernalization causes great changes in the relationship between synthesis and hydrolysis of the substances in the seeds. In the leaves of vernalized plants catabolism is greatly accelerated. In the natural state, early ripening of plants is associated with the hydrolytic activity. The same conditions obtain when the vegetative period is artificially shortened. Changes in biochemical activity in plants resulting from vernalization are quite different from changes caused by ether narcosis, dehydration and similar processes. In the case of the latter processes, changes of a localized character only occur, which later disappear without a trace and have no lasting effect on the life cycle of the plants. Changes in biochemical activity due to vernalization, on the other hand, are retained during the subsequent development of the plants.

Experiments at the Biochemical Institute with the seminal offspring of vegetative hybrids have shown that the morphological changes occurring in them are reflected both on the biochemical activity of their fruits and in assimilatory activity. In several instances hybrids had new characters which neither of the hybrid's parents possessed. An improvement in useful characters also occurred. A study of the seminal offspring of both sexual and asexual hybrids has shown that changes of biochemical characters in the fruits follow a regular pattern.

*Petrov, S. G.* (*Ibid. No. 219 : p. 2*).

Extensive use of initial breeding material has been the main feature of Mičurin's work. This method was also used by M. F. Ivanov in his animal breeding work. Soviet fowl breeders are now following their example.

The theoretical basis of the Soviet fowl breeders up till quite recently has been influenced by the Morgano-Mendelians. Mihalkov wrote a formalist book on fowl breeding. A. S. Serebrovskiĭ urged fowl breeders to use inbreeding.

The author regrets that his own book, published in 1934, contained a number of errors and paid tribute to formal genetics.

M. F. Ivanov's thesis that environmental conditions in general and animal food in particular exert the strongest influence on the pedigree, is now being appreciated.

Since present textbooks on genetics are full of formal and unscientific nonsense, they should be replaced by new books based on Mičurin's genetics.

*Perov, S. S.* (*Ibid. No. 220 : p. 3*).

The teaching of Mičurin and Lysenko in agrobiology is the only correct one. Autogenesis as taught by formal geneticists is rejected. Šmaljgauzen is subjected to criticism for his formalist views. Weismannites in general are accused of coercive active against their opponents. E. A. Bogdanov and M. F. Ivanov are named among their victims.

*Bušinskiĭ, V. P.* (*Ibid. No. 220 : p. 3*).

This address is devoted to soil science and rotations. Allusion is made however to the ideological struggle in biology and agrobiology.

*Rapoport, I. A.* (*Ibid. No. 220 : p. 2*).

The view is expressed that struggle between opposing theories leads to a true theory and that suppression of any theory is harmful to science.
Darwin is asserted to be the father of the contemporary theory of genes, natural selection being unthinkable without the assumption of genes as material units.
The bourgeois geneticists Bateson, Johannsen and Lotsy rejected the connexion existing between the genes and the chromosomes. These idealist geneticists needed something to replace the materialist theory, which they rejected, and they therefore endeavoured to explain inheritance by psychosis. Such were the theories of Zemon, Driesch and Cope. Mach, another idealist, arrived at a theory of memory and requirement to explain inheritance, the requirements going beyond the limitation of matter. Prezent's theory of requirements is stated to be similar to that of Mach.
Genes and chromosomes were discovered as a result of laborious research. Soviet geneticists have proved that genes are not unchangeable, but mutable. They have discovered chemical substances which can bring about large hereditary changes in organisms. Weismann's thesis that embryonic cells are isolated from somatic tissue is refuted.
Genes though not yet perceptible are real and material.
Soviet geneticists have never been anti-Darwinian; they have provided a material basis in the chromosomes for the principles of natural selection.
Genetics has provided several methods for inducing hereditary changes. It is therefore useful to socialist agriculture.
The utilization of heterosis can raise the yield of maize by over 25%, and this technique can be applied to several other crops, such as sugar cane and castor oil.
Artificial induction of polyploidy by colchicine is another technique which has a great scope.
There are many crops such as kok-saghyz, tau-saghyz, sunflower, hemp and buckwheat, in which the tetraploids are superior to the initial diploids. The method of induced polyploidy is very promising, and shows that man can create new forms in a short space of time.
Genetics is also of the greatest use in veterinary microbiology, and can be used to breed bacteria pathogenic to harmful bacteria.
The principle of natural selection is incompatible with Lamarckism, yet the form of Lamarckism rejected by Darwin has been accepted by Lysenko. However, changes in plants and animals cannot be brought about by wishful thinking. Mičurin himself stressed repeatedly the need for more active methods than limiting oneself to environment in the broad sense. All Soviet biologists share Mičurin's theories of selection, which formed the basis for all his work. Mičurin pointed out the possibilities of the widest application of genetics to horticulture and agriculture, and urged students to study genetics.
It is our duty to train students to advance science, and our principles must be subjected to fearless criticism.

*Babadžanjan, G. A.* (*Ibid. No. 220 : p. 4*).

The Armenian Institute of Genetics, using methods introduced by Mičurin and Lysenko, has produced valuable new wheat, tomato, vine and fruit varieties. Sexual and vegetative hybridization, together with environmental treatments in the nursery have been found productive breeding methods. Work is also in progress at the institute on selective fertilization, vegetative propagation and phasic development.

Morganists are condemned as conservative and idealist. Rapoport is accused of Weismannism.

*Avakjan, A. A.* (*Ibid. No. 220 : p. 2*).

Lysenko has created a theory of directed change of organisms, which provides means for mastering the natural process of creation of new forms. Planned changes of organisms and the inheritance of these induced changes is possible because the organism is changed first in accordance with changes in its environment and then the changed organisn produces sex cells which differ correspondingly from the original sex cells. Environment has a decisive role in these planned changes. Spring forms of grain crops, obtained from winter crops by regulating the environment, have the growth habits of ordinary spring crops. Changed organisms, however, being unstable, are highly susceptible to environmental influence.

The laws of dominance and purity of the gametes are the basic principles of Morganism. Morganists reject the possibility of directed dominance in the $F_1$. Variation in the $F_2$ is explained by them as a result of random segregation of chromosomes at meiosis. It has been shown, however, that in crosses between winter and spring cereal varieties, spring winter types can be obtained at will in the $F_1$. For instance spring rye, sown in late autumn, and pollinated in the following year by winter varieties, gives a large number of $F_1$ hybrids in which the winter habit is dominant.

Mičurin's methods are equally efficacious in controlling $F_2$ variation.

It has been found in experiments with hybrid onions, that different offspring are obtained from the seed-propagated plants and plants reproduced from the bulbs. The offspring differed in both shape and colour. The differences persisted in the following generations independently of the method of reproduction.

Morgano-Mendelians believe that the initiation of a new life cycle depends on the rejuvenizing effect of meiosis. Soviet scientists attribute rejuvenation both to sex cells and to the organs of vegetative reproduction. To establish this point onions producing bulbs as well as seed were investigated. It was found that the young plants, both from the bulb and from the seeds, required the same sort of environmental conditions for the early stages of development.

$F_1$ interspecific hybrids are often sterile. Morgano-Mendelians treat the plants chemically in order to double their chromosome numbers. The author, however, has produced two centners of seed of $F_1$ hybrids obtained from crosses of hard and soft wheat. The hybrid plants were fertile and many hybrids produced as many as 1500 grains.

Reference is made to *Triticum-Agropyron* hybrids, but it is stated that so far no hardy perennial wheats are forthcoming.

*Vodkov, A. P.* (*Ibid. No. 223 : p. 3*).

Lysenko has shown that science can only thrive on the theoretical basis of dialectical materialism. Soviet scientists must work out agricultural methods which will end fluctuations in yearly harvests; they must improve soil fertility and create conditions for increased productivity in animal husbandry. All these tasks can be fulfilled if the teaching of Lysenko and Williams on the effect of the environment upon organisms is put into practice.

*Beleckiĭ, Z. Ja.* (*Ibid. No. 220 : p. 3*).

The Faculty of Biology at Moscow University is a stronghold of Morgano-Mendelian reactionary genetics. The vast majority of its professors, lecturers and students are bitter opponents of Lysenko's theories. Conferences and meetings have been held with the main purpose of criticizing Lysenko. Šmaljgauzen, Judincev, Alihanjan and Žebrak are singled out as adherents of formal genetics. Furman is named as one of the few supporters of Lysenko at the University; he held for a time the chair of Dialectic and Historical Materialism in the Biological Faculty.

*Ušakova, E. I.* (*Ibid. No. 220 : p. 4*).

Breeders at the Gribovo Station have abandoned the inbreeding and other faulty methods and are now following more closely Mičurin's teaching.

A large number of promising new varieties has been produced. The following cases are mentioned:—

A. V. Alpatjev has developed a new type of tomato. It is upright, early, and produces good qualities of well-shaped fruits. Mičurin's methods make it possible to breed tomatoes combining earliness and large fruits. Several varieties of tomatoes have also been produced which can be sown at low temperatures in the open. These varieties were obtained by selection of young hybrid plants grown out of doors.

Work has begun with egg plants. Several varieties have been produced which are early under Moscow conditions, and produce satisfactory yields of good quality fruits.

A dwarf pea has been bred which bears very large pods.

Vegetative and sexual hybridization and environmental treatment of the hybrid plants in the open air have given rise to hardy melons, which do well in the Moscow province. The melon variety Gribovskaja 13 sown in the greenhouse on 15 April and transplanted on 20 May, ripens on 14 July. This variety is remarkable for immunity from diseases, hardiness and moderate cultural requirements. The earliness of Gribovskaja 13 is due to its ability to set fruit soon after emergence of the first leaf.

*Vysokos, G. P.* (*Ibid. No. 224 : p. 3*).

Lysenko's technique of wheat cultivation upon stubble in Siberia is praised.

Work is also in progress in changing spring wheats into winter wheats. Autumn sowing upon stubble of spring wheat has led to two important biological discoveries. The first is that the wheat becomes resistant to loose smut. The second is that the seed from such autumn sown spring wheat, when planted again at its usual time in the spring, yields 4 to 5 centners per ha. more than the normal seed of the same variety.

*Gluščenko, I. E.* (*Ibid. No. 221 : p. 3*).

Weismannite theories have nothing in common with materialism. Dialectics, on the other hand, show that biological processes involve the effect of external action, and that such external influences become internal properties after their assimilation by the organism. This leads Mičurinism to the conclusion that properties acquired by organisms during the process of development, are hereditary. This position is contended by the Neo-Darwinists and the mechano-Lamarckians. Timirjazev is quoted as holding the view that Darwinism and Lamarckism are not incompatible.

The Soviet experiments with vegetative hybrids contradict Neo-Darwinism, which maintains that inheritance is not connected with changes in metabolism. The importance attached by Neo-Darwinism to the Malthusian population law is criticized.

*Horošilov, I. I.* (*Ibid. No. 220 : p. 4*).

Practical achievements due to Lysenko, Mičurin and Williams are listed.

*Dolgušin, D. A.* (*Ibid. No. 220 : p. 4*).

The following criticisms of formal genetics are advanced: (1) The theory of pure lines, which states that selection of pure line varieties is useless, has caused the loss of many valuable local established populations. (2) The thesis that environment has no influence upon varietal seed quality, has resulted in breeding for varietal characteristics rather than for varietal improvement. (3) The former agronomic practice of sowing rye seed plots at distances of at least 1 km. is unnecessary and biologically detrimental. (4) The State Varietal Testing System is still insisting that new varieties should be homozygous. Varieties, therefore, which are disuniform regarding some minor characters are not accepted, although they may yield twice as much as others, and be more valuable in other respects. (5) The Mendelian theory of combination of characters in hybridization ignores the effect of environment, though by subjecting "shattered" $F_1$ hybrids to environmental influence, forms having desired combinations of characters can be obtained.

*Šaumjan, V. A.* (*Ibid. No. 220 : p. 4*).

The application of Mičurin's principles to animal husbandry is illustrated from work on the Kostroma pedigree cattle. The best animals came from the Karavaevo State Farm, where they were improved for many years by S. I. Šteĭman, mainly, it is claimed, through abundant and varied diet.

The author concludes that environmental conditions such as abundant fodder, skilful milking, and the methods of rearing the young, play an important part in breeding pedigree cattle.

*Mitin, M. B.* (*Ibid. No. 221 : p. 3*).

The reactionary, idealist Morgano-Mendelian school of thought, founded by Weismann Mendel and Morgan is denounced and its Soviet followers are called unpatriotic. Dubinin's research on the chromosomal apparatus of *Drosophila funebris* is given as an example.

Morgan, Johannsen and de Vries are described as opponents of Darwinism.

The following Soviet scientists are criticized: B. M. Zavadovskiĭ, who perpetuates some of Darwin's errors; Ju. A. Filipčenko, who disassociated genetics from evolutionary theory; N. K. Koljcov, on account of his views on pure lines; and A. P. Žebrak, A. S. Serebrovskiĭ and I. I. Šmalgauzen, on account of the Weismannite, Mendelian and Morganist content of some of their work.

It is pointed out that Mičurin states that science can only be built up on the teachings of Marx, Engels, Lenin and Stalin. Criticisms of menshevik idealism in philosophy and natural science by the Communist Party and in the newspaper *Moscow Worker* in 1931, are mentioned. These criticisms are interpreted as applying to such scientists as Serebrovskiĭ and Dubinin.

Lysenko is praised for his prominent part in the struggle with Morgano-Mendelism and for his practical contributions to biology.

*Čekmenev, E. M.* (*Ibid. No. 221 : p. 4*).

A compromise between the scientific biology of Sečenov, Mečnikov, Timirjazev, Williams, Mičurin and Lysenko, and the foreign reactionary Weismannite genetics is impossible. Rapoport, who suggests the utilization of the best achievements of Mendelian genetics (cf. above), avoids the main point of the controversy. Morgano-Mendelism causes serious economic loss in practice.

The successes of the Mičurinite animal breeders M. F. Ivanov, K. D. Filjanskiĭ, S. F. Pastuhov and S. I. Šteĭman are extolled, and contrasted with the mediocre results obtained by the formal geneticists Ja. L. Glembockiĭ and A. S. Serebrovskiĭ.

*Puhaljskiĭ, A. V.* (*Ibid. No. 220 : p. 4*).

Scientists following Mičurin and Lysenko have given commercial agriculture many useful discoveries, while no valuable contributions are known to have sprung from the work of the Morgano-Mendelians.

*Zorin, F. M.* (*Ibid. No. 223 : p. 4*).

Mičurin's mentor method has been used at the Soči Research Station.

It has been possible to change the colour of haricot beans from black to yellow. The colour of plums was changed from blue to red, and the dates of ripening were also altered. In 1947 fruits from grafted inflorescences of some citrus hybrids produced seeds that showed great differences in shape and colour. Plants raised from these seeds were also different from the original plants. While most citrus fruits bear fruit in the seventh to fifteenth year, some individual grapefruit hybrids set blooms in their first year. The pollen from these early flowering grapefruits has been used for pollination of other useful varieties. As a result, citrus hybrid plants are available that set flowers in their first year. Further proof of the efficacy of Mičurin's method is provided by the work at the station on tea. The cultivation of tea has been extended northwards. It is now planted in the Kuban, Kubarda and the North Osetian autonomous area. As a result of repeatedly planting tea in areas located further and further north, plants have been secured which resist temperatures as low as —20° C.

*Grebenj, L. K.* (*Ibid. No. 220 : p. 4*).

The methods of the animal breeder M. F. Ivanov, which are said to conform with the principles of Mičurin's genetics as developed by Lysenko are approved. These require (1) breeders equipped with advanced theories and Stahanovite experience; (2) favourable environmental conditions for the development of the animals, and (3) correct pairing and selection of animals.

The "leader principle" of A. S. Serebrobskiĭ and the theory of cryptorchism of Ja. L. Glembockiĭ are given as harmful examples of formal genetics when applied to animal husbandry.

*Dmitriev, V. S.* (*Ibid. No. 220 : p. 3*).

Scientific work which does not assist practical agriculture is condemned. Šmaljgauzen and the soil scientists Rode and Kovda are criticized for expressing views incompatible with progressive improvement in agriculture.

Soviet agronomic theory must provide for constant harvest increases. This is realized by the Dokučaev-Kostyčev-Williams agronomic system.

The services to Soviet agriculture made by Lysenko and the Mičurin school are listed.

*Kostrjukova, K. Ju.* (*Ibid. No. 220 : p. 2*).

Bourgeois genetical conceptions are criticized on ideological and political grounds, and alarm is expressed at their widespread diffusion in the U.S.S.R. The centre of bourgeois genetics in Russia is at Moscow University, from which scientists imbued with such ideas have proceeded to editorial posts on such publications as the *Žurnal Obščei Biologii* (Journal of General Biology), *Izvestija Akademii Nauk S.S.S.R.* (News of the U.S.S.R. Academy of Sciences), and *Doklady Akademii Nauk S.S.S.R.* (Reports of the U.S.S.R. Academy of Sciences). Papers with Mičurinite content have not been accepted by these journals and Morganist teaching has been substituted. The influence of the University has also been felt at the Ministry for Higher School Education.

Rapoport (cf. above) is charged with being a Morganist, his acceptance of genes as the material units of inheritance forming the main point of criticism. Muller and M. M. Zavadovskiĭ are also adversely criticized.

The author then gives a brief outline of her cytological researches on the structure of the male gametes in *Lilium Martagon* L.

*Muromcev, S. N.* (*Ibid. No. 223 : p. 3*).

New ideas, like those of Lysenko's, should be introduced into microbiology to free it from the metaphysical laws of the constancy of the species and of autogenesis.

Rapoport is criticized as a Weismannite.

*Zavadovskiĭ, B. M.* (*Ibid. No. 224 : p. 2*).

Lysenko is supported for his fight against Weismannism, Malthusianism, formal genetics and Mendelianism, i.e. Mendelism disturbed by reactionary idealist and metaphysical elements. At the same time the author objects to being referred to, with other Soviet scientists, as a formal geneticist, just because he fails to agree with Lysenko.

There are not two schools of biology in Russia; there are three: orthodox Darwinism, and its two deviations, (*a*) the vulgar mechanism of the mechano-Lamarckians, and (*b*) the reactionary neo-Darwinist teaching of Weismannism and formal genetics.

Timirjazev is cited as making a sharp distinction between Mendelism and Mendelianism. Valuable Morgano-Mendelian contributions to science cannot be thrown aside, but ought to be added to Mičurinism. The study of polyploidy represents a concrete achievement. Wheat and rye varieties, for instance, developed by Šehurdin, Lisicyn and Konstantinov are widely planted in the U.S.S.R. Their breeding methods derived help from Mendelism. It is suggested that the term "Morgano-Mendelism" should be applied to the positive side of genetics and that the terms "Weismannism", "autogenesis" and "formal genetics" should be used for describing the reactionary idealist aberrations of bourgeois geneticists. Šmaljgauzen deserves some of Lysenko's criticisms, but he has struck serious blows against Weismannism and formal genetics.

Mičurin must have the first place in Soviet Darwinism, but his teaching should not exclude other useful ideas.

The view attributed to Lysenko that vegetative hybridization promises useful results in animal breeding is ridiculed. Defamation of scientists who disagree with Lysenko's views is deprecated. In this connexion it is suggested that there may be significant differences between the teachings of Mičurin and Lysenko. Mičurin's principal method of obtaining new forms was distant sexual hybridization. He used grafting only to retain and to propagate the best selected hybrid forms. The idea of mutual interaction between the stock and scion. was only a secondary development. Lysenko, on the other hand, considers that vegetative hybridization is the chief method of "shattering" inheritance.

Uncritical acceptance of Lysenko's view is deprecated. His concept of metabolism for instance requires elucidation. Concrete definitions are also needed of his concept of assimilation and dissimilation.

Lysenko's analysis of the present position of biological science is unsatisfactory. He does not oppose the mechanist deviation of Darwinism, and at the same time he attacks, along with formal geneticists, scientists who support orthodox Darwinism against its two deviations.

*Dvorjankin, F. A:* *(Ibid. No. 224 : p. 4).*

Too much credence should not be given to bourgeois science. Soviet scientists take the best from classic Darwinism, but only in as far as this is concordant with Mičurin's teaching. Morgano-Mendelism is a bourgeois philosophy seeking nothing but the exploitation of Nature. B. M. Zavadovskiĭ's claim that there are three schools of biological thought in Russia is discounted (cf. above). The "orthodox" Darwinists, Šmaljgauzen, Žukovskiĭ, A. I. Kupcov, Žebrak, I. M. Vasiljev and Rapoport are criticized.

"Orthodox" Darwinism is merely a blind to safeguard Weismannism and its principle that properties acquired through environmental influence cannot be hereditary.

Papers published by Žukovskiĭ, Zavadovskiĭ, Kupcov and Žebrak are listed to show that there has been no editorial descrimination against them.

*Feĭginson, N. I.* *(Ibid. No. 223 : p. 3).*

Formal geneticists are blamed for the lack of practical results in commercial seed growing. Lisicyn's rye variety is said to have been developed, not by applying Mendelian ideas, but by selection from local material. Attempts have been made to apply Morganist selection principles for uniformity of the variety regarding external characters. This has led to a catastrophic fall in the productivity of Lisicyn's rye, and it has only been saved for agriculture by bringing such selection to a sudden end.

Mendelian methods of selecting parental forms for desirable characters, and hybridization of these forms in order to obtain combinations of characters, and the search in the offspring for ready-made varieties have been a failure. This applies to spring wheats and peas, work on which has been conducted at the Mordva Research Station. On the other hand, work with hybrid varieties of winter rye, developed according to instructions from Lysenko has given several varieties which are being tested and propagated on collective farms.

Self-pollination and selection of selfed lines of maize are described as Morganist techniques, which make seed production difficult and play into the hands of capitalist seed firms.

Intravarietal hybridization of wheat at the Mordva Research Station has been obstructed by Mendelians from the Institute of Grain Husbandry of the South Eastern U.S.S.R.

Reactionary genetics as taught at various institutes and propagated in periodicals produced by the U.S.S.R. Academy of Sciences are deprecated.

*Krylov, A. V.* *(Ibid. No. 223 : p. 4).*

Work at the Institute of Agriculture of the Central Black Earth Belt has been carried on for 56 years. The work which Dokučaev began in 1892 has borne fruit only after the application of the theoretical principles of Williams and Lysenko. From 1934 to 1938 the Institute went over to Williams' rotation system and Lysenko's principles in breeding and seed growing were introduced concurrently. The results since abandoning formal genetics include the following. Several varieties of high yielding winter wheats have been developed. Of these Stepnaja 135 (Steppe 135) has passed the State varietal trials and is being grown for commercial distribution in the Voronež province. The old winter rye variety Mup has been completely regenerated. The new élite of this variety is superior in yielding capacity to the Lisicyn and Voronežskaja SHI (Voronež Agricultural Institute) ryes. The Institute has produced a haricot bean variety Stepnaja 5 (Steppe 5), which has been approved as a standard variety, and a new yellow hybrid lucerne Stepnaja 600 (Steppe 600) which is more productive than the standard variety Grimm Zaĭkevič.

Lysenko's methods of intravarietal hybridization, supplementary pollination and systematic selection have been used successfully in the production of élite seed.

*Rubin, B. A.* (*Ibid. No. 224 : p. 3*).

Chemical changes in plants brought about by external conditions adapt the plant's main metabolic process to its environment. Among such adaptive reactions are changes in the enzyme systems of plants. These changes occur frequently during the whole growth period. Experiments support the view that changes in the enzymatic activity of plants are due to an historical adaptive process. These facts tally with Lysenko's theory of phasic development, and the supposition that the requirements of the different phases of the life cycle depend on the evolutionary history of the species and on the environment in which the plant developed.

*Teterev, F. K.* (*Ibid. No. 224 : p. 3*).

The study of plant resources on the former basis of morphological and cytogenetical studies has given way to the new methods of Mičurin and Lysenko.

Some results with vegetative hybrids of pome, stone and soft fruits, are reported:—

(1) Mičurin's cherry variety Krasa Severa [Beauty of the North], which was obtained from the cross Vinkler Belaja (White Winkler) x Vladimirskaja (Vladimir) had been removed from the list of standard varieties on account of irregular bearing. The variety was worked on Lotovaja [Loaded] at the experimental Station at Pavlovsk, and pollinated by Lotovaja. The operation resulted in trees with a high cropping capacity.

(2) Mičurin's mentor methods and his mixed pollen technique have given good results with Steppe type almonds, grown in the Leningrad province. These trees bloomed regularly but did not bear fruits either after open pollination or after pollination by selected peach varieties. The almonds were grafted on cherry stocks and the vegetative hybrids were pollinated in 1947 and 1948 with pollen of peach varieties. The plants set 32% fruits when pollen from single varieties was applied and a 100% fruit set when mixed peach pollen was used.

(3) Gooseberry hybrids from the cross Hauton (Houghton) x Belyĭ Plodorodnyĭ (White Prolific) did not set fruits when self-rooted, but flowered in the second year after grafting on to currant stocks.

(4) Mičurin's methods have produced new hardy, productive varieties of cherries suitable for cultivation in the Leningrad province. The flavour of the fruits is superior to that of southern varieties. The ripening season lasts from 5 July to mid-September.

The poor productivity of the Mičurin apple variety Beljfler Kitaĭka (Bellefleur Chinese Crab) in some districts is attributed to disregard of the environmental requirements of the variety. The same explanation is given for the poor results obtained with distant hybridization of grain crops at the Institute of Grain Husbandry of the non-Black Earth Belt.

*Judin, V. M.* (*Ibid. No. 221 : p. 2*).

The principle of vegetative hybridization is important in animal husbandry. The importance of environment on inheritance is stressed. Petrov and Vasin are charged with formalist misconceptions of genetics, and Glembockiĭ, Deĭhman and Okuličev are criticized for their book on sheep breeding. A. I. Mikojan is mentioned as an animal breeder actively supporting Mičurin's contention of the paramount importance of environment.

*Lukjjanenko, P. P.* (*Ibid. No. 223 : p. 3*).

Mičurin's practice of crossing varieties from different geographical origins has been found efficacious with winter wheats at the Krasnodar State Breeding Station. All the winter wheat varieties developed at the station have been obtained from crosses selected according to Mičurin's principles. The good quality winter wheat Novoukrainka 83 [New Ukrainian

83) resulted from a cross between Ukrainka [Ukrainian] and the Canadian spring wheat Marquis. Work with an early productive winter wheat from the Kuban is in progress at the station. Mičurin's methods for choosing parents in hybridization were used and the plants included such distant forms as the hybrid wheat variety Kanred x Fulcaster, and a spring wheat variety bred in Argentina. Selection work aimed at the production of very early, high-yielding forms of winter wheat. The first early wheats had certain defects such as lack of hardiness, but as a result of breeding work that followed, a new highly productive and early ripening variety has been produced.

In breeding winter wheats in the Kuban, one of the main objects is rust resistance. Production of amphidiploid forms from *Triticum Timopheevi* hybrids by means of colchicine treatment gave poor results. *T. Timopheevi* is noted for its high resistance to fungous diseases, but the crosses of this wheat with other wheats resulted in hybrid amphidiploid forms which very rapidly lost their resistance to rusts. The amphidiploid forms had also such defects as brittle spikes and poor threshing properties. A simpler method for development of rust resistant wheats is the combination of intraspecific hybridization and the application of Lysenko's theory of phasic development. The method consists of hybridization of the varieties showing resistance to brown rust, and differing in their phasic development. This method has given varieties that are valuable for their high yielding capacity and their resistance to rusts.

Changing the nature of plants through external action is a new method available to the breeder. The method will change winter wheats into spring crops and vice versa. The examples given are changes of the winter wheat Vorošilovskaja [Vorošilov] and the spring wheat 027. When the latter wheat was turned into a winter wheat and the former into a spring wheat, segregation for rust resistance was noted among the progeny. The variety Vorošilovskaja, which is highly susceptible to rusts as a winter wheat, produced some 20% rust resistant forms when it was turned into a spring wheat. The variety 027, on the other hand, normally rust resistant, produced rust susceptible winter plants. In these instances a clear relationship has been established between rust resistance and the first phase in plant development. The practical importance of these experiments lies in the possibility of developing without hybridization new highly rust resistant forms from rust susceptible forms.

*Mihalevič, A. V.* (*Ibid. No. 224 : p. 3*).

Improved harvests and other practical results are used as an argument in support of Mičurin, Williams and Lysenko. Lysenko's contributions to Soviet economy are listed.

*Alihanjan, S. I.* (*Ibid. No. 223 : p. 4*).

The metaphysical conceptions of Johannsen, Weismann, De Vries, Bateson and Lotsy are rejected, and the Soviet scientists Filipčenko and Serebrovskii are criticized, the former on account of his theory of autogenesis, and the latter for his belief in gene reservoirs. Muller is cited to the effect that environment has an influence upon hereditary properties, and Rapoport's work on chemically induced hereditary changes is noted.

There is nothing idealist about chromosomes and genes, but they must be considered in the light of dialectical materialism, and the chromosome theory must be purged of idealist elements.

Both Mičurin and Timirjazev have recognized the Mendelian laws of inheritance. Mičurin's criticism of Russian Mendelianists was due to disregard by the latter of the importance of environmental influence.

The division of scientists into Mičurinites and non-Mičurinites is futile.

Vegetative hybridization is not the core of Mičurin's teaching. Mičurin's important contribution, was his improvement upon the theories of Grellj through the introduction of the mentor method.

Contemporary genetics has given much besides the idealist conception of the constancy of genes and genotypes, the constancy and autonomy of genes, and the supposition that environment is without influence on evolution.

Indiscriminate condemnation of the achievements of genetical science should be stopped. It is regretted that no reports have been submitted at the session on Saharov's work with buckwheat, Navašin's work with kok-saghyz, Hadžinov's experiments with inbred maize, Glembockiĭ's work with sheep, Hižnjak's work on wheat hybrids and Šehurdin's achievements with wheats. Special mention should also be made of the work of Cicin, Pisarev and Žebrak, and also of Astaurov's work on silk worms. The work of these and other scientists has shown the extent to which the experimental data of contemporary genetics can be applied to agricultural practice.

It is pointed out that people like Darlington and Sax are exploiting the differences between the Soviet scientists. There should be no opportunity for such manoeuvres.

*Poljakov, I. M.* (*Ibid. No. 223 : p. 3*).

The author deprecates the tendency to label Soviet scientists as Morganists or similar titles because they fail to agree with Lysenko. Šmaljgauzen's view are defended and it is pointed out that he has severely criticized autogenesists, Weismannites and preadaptationists. The following scientists are criticized as anti-Darwinian: Morgan, Goldschmidt, Shull, Simpson, described as Weismannites and neo-Darwinians, and Harms, Weidenreich and others, who are described as Lamarckians. The theory of preadaptation advanced by Morgan, Shull, Hurst and others, Punnet's support for Batsonism, and Griggs' efforts to revive Lotsyism are exposed. These idealist views are due to several serious theoretical mistakes in formal genetics, such as the failure to understand the physiological nature of heredity, and also the metaphysical conception of hereditary structure. Such fallacious views are found in the papers of the Soviet scientists Filipčenko, Koljcov and Serebrovskiĭ. Soviet science, which is interested in finding methods for the creation of new pedigree animals and varieties of agricultural crops, must defend Darwinism and purge it of certain errors and mistakes. The chief fallacy of Lamarckism is not its emphasis on the environment, but its idealist assumption of preordained directiveness.

*Žukovskiĭ, P. M.* (*Ibid. No. 222 : p. 2*).

Strong support is given to the chromosome theory of heredity. This theory has explained the origin of cultivated cotton, and helped to elucidate the origin of tobacco, maize and other plants. Very recently Elengorn has devised a method for differential staining of the parental chromosomes, in the cells of the offspring; the technique utilizes the differential charges that the two sets of chromosomes bear. Mendel is acclaimed by the author as an important contributor to biological theory. Doubt is expressed whether hard wheat can be changed to soft wheat by merely sowing it twice in succession in winter, or whether similar methods can give unsurpassed hardiness to a spring wheat.

Assuming that changes can be induced as readily as Mičurinism claims, the author challenges the Mičurinites to render fertile through environmental influence, mules and triploid apples, pears, bananas and other fruit varieties.

He also suggests that they raise the seed content of Saharov's tetraploid buckwheat.

The author repudiates the charge of having displayed partiality in the Commission of Examiners for academic positions, of which he is the head. He even claims that if he had erred, it has been through too great leniency toward theses presented by some of the Mičurinites. Thus, the theses of the following Mičurinites, Nuždin, Kostrjukova, Belenjkiĭ, Turbin, and Gluščenko have been accepted. Theses by many other Mičurinites however, have been of such poor quality that they have been rejected.

*Žebrak, A. R.* (*Ibid. No. 223 : p. 4*).

An account is here given of investigations on polyploidy in wheat, buckwheat, millet and other cultivated plants. The conclusions drawn from the experiments may be summed up as follows. Wheats are divided into three groups, the 14, 28 and 42 chromosome wheats. The most widely distributed species is the soft wheat, *Triticum vulgare,* comprising both spring and winter forms. The hardiest wheats belong to the group with the largest chromosome number. This fact proves convincingly that chromosome number has an important place in the process of evolution. The better varieties of oats, tobacco and other cultivated plants also belong to the species with the larger chromosome numbers. In recent time geneticists have discovered effective chemical and physical methods of increasing the chromosome number of cultivated plants. In the wheat experiments interspecific hybrids were used. The author and his colleagues have produced amphidiploids from nine different species of wheat. In recent years three groups of wheats have been obtained with the chromosome numbers, 42, 56 and 70. A 42-chromosome wheat has been obtained experimentally from a cross between *T. durum* with *T. monococcum*. The $F_1$ hybrids had 21 chromosomes and were sterile. After chromosome doubling, 42-chromosome types were secured. This is the most probable way in which the 42-chromosome species of wheat arose in nature. The 56 and 70 chromosome wheats represent valuable material for further breeding work and for theoretical study. Particularly useful results were obtained from further hybridization of these types with *T. vulgare*. The crosses between the 56 chromosome types and *T. vulgare* give 49-chromosome $F_1$ hybrids, which were nearly sterile. In the following generations however, their fertility improved, and more balanced types were produced. From the $F_4$ and $F_5$ progenies of these hybrids, plants could be secured with high fertility. Individual plants yielded over 1500 grains each, and the spikelets 7 to 9 grains each. The grain was vitreous and the 1000 grain weight was 40 to 50 grm. Among the families of the $F_5$ generation, several lines occurred identical with existing wild wheat species such as *T. compactum* and *T. Vavilovii*. Other types were similar to forms of cultivated wheat. These polyploidy studies provide proof that the contemporary chromosome theory of inheritance is sound.

Besides distant hybridization and the study of polyploidy, the pure line method of breeding wheat is being used. This work has given four valuable lines, two of which were submitted to State varietal tests in 1946. According to the figures for the Moscow province, these wheats yielded 41·9 and 41·1 centners per ha. respectively, the yielding capacity of the standard variety being 39·2 centners per ha. On another plot, the figures were 31·8 and 29·2 centners per ha. respectively, and the comparative yield of the standard variety 28·9. One of the two lines is entirely free from lodging and is particularly suited to combine harvesting. The $F_4$ and $F_5$ polyploid wheat hybrids available possess certain economic properties which make them superior to the best lines of wheat secured by ordinary methods. Tetraploid buckwheats and millets have been produced from several varieties. The autotetraploids of both these crops are less productive than the diploids, but their 1000 seed weight is 25 to 30% higher. In order to increase the yielding capacity of the new tetraploid types of buckwheat and millet, Mičurin's method of crossing geographically distant varieties has been used. The analogous behaviour of the plants compared with that established for wheats guarantees that the fertility of the hybrids of the tetraploid varieties will be raised.

Work on wheat, buckwheat and millet shows that nuclear structure forms the material basis of inheritance and development. Nuclear structure is also dependent upon its environment. New plant forms can be created experimentally by means of hybridization and the use of strong chemical and physical influences. Recent results with colchicine, acenaphthene and other substances show that geneticists have mastered the process of evolution and can create new forms of plants.

*Turbin, N. V.* (*Ibid. No. 223 : p. 4*).

Mičurin's followers possess a large collection of data undermining the foundations of Morgano-Mendelism. These are briefly listed as follows:—

(1) Grafting can give rise to vegetative hybrids, combining the characters of the two initial plant forms and thus resulting in the combinations of the chromosomal sets of these forms.

(2) Segregation of the hybrid offspring occurs in vegetatively reproduced plants as well as in sexually produced progeny. This means that segregation is not determined by chromosome splitting or gene reduplication.

(3) Heterozygous plant hybrids can under certain conditions, give non-segregating uniform seed progeny.

(4) "Pure" non-hybrid plants can under certain conditions produce segregating offspring.

(5) Environmental conditions favouring the development of the characters of one of the parents of a hybrid will influence the hybrid to develop in that direction.

(6) Changed environmental conditions produce plants whose hereditary nature is changed. In contrast to this, Morganist geneticists, holding metaphysical views of the continuity and

independence of the germ plasm, maintain that the inheritance of acquired characters is impossible.

*Šmaljgauzen, I. I.* (*Ibid. No. 221 : p. 4*).
[*Schmalhausen, I. I.*]

The author replies to criticisms made of his ideas at the session as follows:—
(1) The charge of holding idealist views is rebutted. The author objects to being called a formal geneticist, since he is not a geneticist at all but a morphologist, embryologist and phylogenist.
(2) The author states that he holds materialist views, and that he has already criticized Weismannism, de Vries, formal genetics, Lotsy and the theory of preadaptation.
(3) The effect of environmental influence on hereditary changes in organisms is acknowledged, but the nature of the organism is stronger than the environment in determining the nature of the changes.
(4) Unpredictability of any changes in organisms is denied. Adapted changes through natural selection are hereditary.
(5) The conception of D. Rosa and other bourgeois biologists that evolution follows a descendng curve is contrary to the author's idea.
(6) The theory of stabilizing selection was referred to at the session, but its essential points were not touched on. The author considers that all mutations are harmful, including adapted imutations.
(7) The charge of developing theories disadvantageous to practical agriculture is rejected.
(8) The omission by the author of references to Mičurin, Timirjazev, Cicin and Lysenko in the book *Evolutionary Factors*, is due to the fact that their contributions were irrelevant to the context of that book. They have been mentioned in the author's article *Darwinist Problems*.
(9) Prezent's reproach for attaching too much significance to hybridization is turned down. It is agreed that hereditary changes can occur without hybridization. Weismann's theory of amphimixis said by Prezent to be followed by the author, is rejected.

*Simonov, I. N.* (*Ibid. No. 224 : p. 3*).

Support is given to the scientific ideas of Mičurin, Williams and Lysenko. It is stated that Mičurinites have been victimized at the Timirjazev Agricultural Academy, and the following are named: Ušakova, Tihonenko, Veprikov, Pavlova, and Rubin. The Institute as a whole, including its director, V. S. Nemčinov, and Žebrak is accused of reactionary leanings and hostility to Lysenko. The only Mičurinites at the Institute now are: Jakuškin, Bušinskiĭ, Edeljšteĭn, Timofeev, and M. G. Čiževskiĭ.

*Demidov, S. F.* (*Ibid. No. 221 : p. 2*).

Formal geneticists are criticized for their failure to achieve practical results. A list of achievements of Mičurin, Timirjazev, Kostyčev, Dokučaev, Williams and Lysenko is given.
P. M. Žukovskiĭ, and B. M. Zavadovskiĭ are criticized on account of their conciliatory attitude to formal genetics; A. P. Žebrak, M. S. Navašin, N. P. Dubinin and S. I. Alihanjan, for their fruitless laboratory work; Šmaljgauzen for the fallacies contained in his book *Evolutionary Factors*; and V. S. Nemčinov because of the Morgano-Mendelianism encouraged by him at the Timirjazev Agricultural Academy.

*Kislovskiĭ, D. A.* (*Ibid. No. 224 : p. 4*).

Mičurin's school of genetics, as developed by Lysenko, is supported by dialectical materialism. Šaumjan is charged with attributing to the author formal genetical views which he has never expressed.

*Vasilenko, I. F.* (*Ibid. No. 222 : p. 2*).

Some American agrobiological practices are condemned.

*Kostjakov, A. N.* (*Ibid. No. 223 : p. 3*).

Williams' methods for soil improvement are expected to provide means for changing plants and animals.

*Lobanov, P. P.* (*Ibid. No. 222 : p. 2*).

Soviet agricultural science is rooted in the teachings of Marx, Engels, Lenin and Stalin. It aims at the successful solution of practical problems. Such is Mičurinite science, which has been developed by Lysenko, who has utilized the teachings of Timirjazev and Mičurin on the production of new varieties, and has combined it with the teachings of Dokučaev, Kostyčev and Williams on soil science. Appreciative reference is made to the following Mičurinite plant breeders: Jakovlev, Kanaš, Lukjjanenko, Ždanov and Ušakova. Animal breeders, Judin, Grebenj, Šteĭmann, Baljmont, Filjanskiĭ and Vasiljev are also approved. Of the opponents of Mičurin the following are criticized, Zavadovskiĭ and Žukovskiĭ.

*Nemčinov, V. S.* (*Ibid. No. 221 : p. 2*).

The task of agricultural science is to change Nature for the benefit of socialist economy. Among the members of the Timirjazev Agricultural Academy, I. V. Jakuškin and V. P. Bušinskiĭ accept Mičurinism; N. N. Timofeev, who holds the Chair of Fruit and Vegetable Breeding at the Timirjazev Academy, also hold views fully in accordance with advanced Mičurinist biology.

P. N. Konstantinov, who succeeded the late P. I. Lisicyn in the Chair of Grain Crops, has produced for Soviet Agriculture many excellent new varieties of cereals. His practical results show that his scientific ideology enables him to work creatively for socialist agronomy.

A. A. Paramonov, author of a text book on Darwinism, is a loyal follower of Darwin and Timirjazev, though he disagrees with Lysenko on some points.

V. P. Bušinskiĭ and M. G. Čiževskiĭ are adherents of V. P. Williams.

Žebrak, though failing in Soviet patriotism, should not be told to discontinue his work on amphidiploidy and experimental polyploidy. This sphere of Žebrak's activity promises very useful results for Soviet agriculture.

Lysenko is right in demanding planned changes in Nature in the interest of practical agriculture and in extending scientific work to the field of the collective farms. His lack of appreciation, however, of the significance of the chromosome theory of inheritance is regrettable. Lobanov's assertion that the Mendelian theory of inheritance is idealist or reactionary is untrue.

Lysenko's discoveries should be taught more extensively by university lecturers on genetics, but the students should be instructed also in the chromosomal theory of inheritance.

*Stoletov, V. N.* (*Ibid. No. 221 : p. 4*).

The following scientists are indicted in the course of a general critique of formal genetics: Žebrak, Žukovskiĭ, Nemčinov, Šmaljgauzen, Dubinin, Romašov, B. M. Zavadovskiĭ and Rapoport. The Morgano-Mendelian argument that tetraploid kok-saghyz vindicates the chromosome theory of inheritance is turned against them on the grounds that the tetraploidy was the result of external action. It can be shown that environmental influences acting upon shattered plants can give new plant forms possessing characters which were absent in both parents.

*Prezent, I. I.* (*Ibid. No. 224 : p. 2*).

There can be no compromise between Morgano-Mendelism and Mičurinism. Minor concessions of Morganism to Mičurinism are not acceptable.

Only few openly declared Morganists now remain in the U.S.S.R. Dubinin is one.

Alihanjan (cf. above) is charged with misinterpreting Mičurin, saying that he denied the influence of stocks on scions. Mičurin denied only the type of influence postulated by Grellj.

Žukovskiĭ may rest assured that Mičurinites cannot admit such elementary mistakes in their experiments with vegetative hybrids as chance pollination by other varieties. The motives of Hudson and Richens who suggest that Russian varieties may not be pure are also questioned (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365).

Žukovskiĭ's complaint that Lysenko and his followers deny the discovery by S. G. Navašin of double fertilization is not accepted. Morganists however have done nothing to explain this phenomenon from a Darwinian point of view. The author's own experiments suggest that double fertilization supplies additional nutrients. Embryos grown apart from the endosperm show phenomena analogous with inbreeding.

Šmaljgauzen is accused of Morgano-Mendelism and the acceptance of the anti-Darwinian views of Cope. Šmaljgauzen's claim to be continuing the work of Severcov is turned down. Severcov's theories have no place for terms like "allomorphosis" or "hypomorphosis."

Paramonov is charged with Weismannism because of his sharp distinction between the organism and its environments.

Makarov has shown that continuity of the chromosomes is a myth. Jeffrey has thrown doubt on current genetical views on chromosomes, heredity and sex determinations (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 655). Shrader also admits the need for a thorough change in modern cytogenetics, saying that only Darlington and his followers are content with the present position of cytogenetical research. Iltis, Mendel's biographer, writes that the stability of genes is now questionable.

B. M. Zavadovskiĭ is accused of Morganist bias. Poljakov's address at the session is criticized for lack of content (cf. above), and the methods mentioned by him for inducing changes in organisms are rejected as methods that depend only on chance.

Rapoport is criticized for borrowing ideas from Mach. Lobašev and Poljanskiĭ are named in connexion with anti-Mičurinite activities at Moscow University. Poljanskiĭ is said to have stated that Lysenko's denial of Morgano-Mendelism borders on nihilism.

### *Concluding remarks of Academician T. D. Lysenko*
*(Ibid. No. 223 : p. 2).*

The difference between Mičurin's genetics and Weismannism is concentrated in a single point, namely their different conceptions of the organism. While idealist genetics makes distinctions between the hereditary substance and the soma, Mičurinites consider inheritance as something inseparable from the whole organism and the environment in which it exists. Experiments in the field of vegetative hybridization prove that all living cells and portions of the organism, not only the chromosomes, have an effect upon inheritance. Inheritance is determined by a specific kind of metabolism. Inheritance changes with changed metabolism.

In reply to Žukovskiĭ's criticisms, some vegetative tomato hybrids were exhibited. One of the plants used in the grafting operation was a tomato variety with potato-like leaves, and red, oblong fruits. The other tomato variety had ordinary tomato leaves but its fruits, when ripe, were yellowish white. The tomato with potato-like foliage was used as the stock, the tomato variety with the incised leaves as the scion. During the year in which the grafting operation took place, no changes were observed on either stock or scion. The seeds from the fruits growing on the scion and on the stock were collected and planted. The seeds collected from the stock gave plants mostly resembling the initial stock variety. Six plants, however, had incised leaves. Some of these plants had yellow fruits too. Sexual hybridization and chance pollination are ruled out, since the cross between forms with incised leaves and yellow fruits, and that with red fruits and potato-like foliage, produces an $F_1$ with incised leaves and red fruits.

Another vegetative hybrid was also exhibited. This plant had incised leaves and differently coloured fruits in the same cluster, some red and others yellow. The phenomenon of variation within an individual is common in vegetative hybrids. Vegetative hybridization is not a normal occurrence, and therefore grafting often causes shattering giving varied forms. Changes due to grafting are rarely conspicuous in plants in the first year or even in the $F_1$, but any grafting operation with plants in an early stage of phasic development produces hereditary changes.

The Genetics Institute of the U.S.S.R. Academy of Sciences is continuing its work on vegetative tomato hybrids.

Further exhibits shown at the session were $F_2$ vegetative hybrids from seed collected from the plants that were not visibly altered in the $F_1$. Many $F_2$ plants underwent a change; their foliage was incised and not potato-like, and their fruits were not red, but yellow. In the $F_1$ the plants had potato-shaped leaves and red fruits. Chance pollination is ruled out because of the colour of the fruits.

Vegetative hybridization also results in the formation of new types. Among the offspring resulting from the operation referred to, there were plants bearing very small fruits like wild tomatoes. Such forms, however, also arise in sexual hybridization.

Experiments with vegetative hybrids prove that every particle of an organism, including the sap exchanged between the stock and scion and vice versa possesses hereditary properties. This does not reduce the importance of the chromosomes in sexual propagation. Chromosomes are admitted, but not the chromosome theory, nor Morgano-Mendelism. Contrary to the declarations of the Morganists the author and his adherents do not disregard any scientific facts concerning chromosomes. Mičurinites are far from denying the effect of X-rays, or colchicine and other substances causing gene mutations. They maintain only that experiments of this sort, which affect the organisms directly and not during its growth in the course of the process of assimilation and dissimilation, can give only very rarely, and then by chance, results useful to agriculture. These methods are not those of purposeful breeding and progressive science. Colchicine methods of production of polyploids in the U.S.S.R. have not justified Morganist expectations by results. Polyploidy studies have not given productive wheat, millet and buckwheat forms. A promising tetraploid kok-saghyz is being tested on a commercial scale. In two to three years it will be seen if this form is better than the ordinary diploid varieties of the plant breeder Bulgakov. There are many cultivated plants whose polyploidy was not caused by colchicine, nor by any other means. Many good pear varieties are polyploid, a smaller number of equally good pears are not polyploid. There are good and poor 28-chromosome and 42-chromosome wheats. Chromosome number does not determine the quality of a variety, and breeding, therefore, must be conducted for desirable varietal properties and not for chromosome number and polyploidy. After a good variety has been produced its chromosome number can be established. Nobody will discard a good variety because it is, or is not, a polyploid.

The wheat varieties Lutescens 062, Melanopus 062 and Ukrainka have been obtained by Soviet Morganists through selection from local varieties. The origin of these varieties is in no way connected with Mendelism.

The followers of Mičurin insist upon varietal improvement through continuous selection. In this they differ from the Morganists who ridicule the idea that repeated selection can have a beneficial effect. It is noteworthy, that in the United States, the home of Morganism, the theory of continuous selection is considered useless for practical agriculture.

The Morgano-Mendelian laws are based on change. Gene mutations according to Morgano-Mendelians occur at random, and so do chromosome changes. The direction of the mutation process is also regarded as accidental. Fertilization, therefore, is not a matter for experimental choice, but is due to the chance meeting of sexual cells. This leads to a chance segregation of characters in the hybrid offspring. By purging Soviet science of Mendelism and Morgano-Weismannism, the element of chance is being purged from biology. Soviet science must produce practical results. Mičurinite teaching cannot be separated from Soviet agriculture on state and collective farms.

*Declaration of P. M. Žukovskiĭ.* (*Ibid. No. 221 : p. 1*).

The author now recognizes the incorrectness of his former views, and undertakes henceforward to assist in the development of Mičurinism as the only possible line of work for a member of the Communist Party.

*Declaration of S. I. Alihanjan.* (*Ibid. No. 221.: p. 1*).

The author henceforward will repudiate formal Weismannite genetics, and he explains that his teachers were largely responsible for his earlier attachment to this point of view. The hope is expressed that Moscow University will become a thriving seat of Mičurinism.

*Declaration of I. M. Poljakov.* (*Ibid. No. 221 : p. 1*).

Reference is made to material in the press by the author supporting Mičurin's theory of selective fertilization. He undertakes in the future to be an ardent Mičurinite and to expose reactionary Weismannism.

*Greetings from the session of the Lenin Academy of Agricultural Sciences to comrade I. V. Stalin.*
(*Ibid. No. 223 : p. 1*).

Mičurinite scientists pledge themselves to develop Darwinism, to expose reactionary-idealist Morgano-Weismannism, to struggle against servility to bourgeois science, and to free research workers from idealism and metaphysics. The idea that man cannot induce desired changes in plants, animals and microorganisms is rejected.

*The resolution accepted at the session of the Lenin Academy of Agricultural Sciences, on the report of Academician Lysenko on the position of biological science.*
(*Ibid. No. 225 : p. 1*).

Lysenko's presidential report to the Academy is approved. The division of biology into two diametrically opposed camps, the Mičurinite and the Weismannite, is accepted as a fact. The work of the Mičurinite biologists at the session, headed by Lysenko, has been useful in exposing the theoretical position of the Morgano-Mendelians.

*Letter of Ju. Ždanov to Comrade I. V. Stalin.*
(*Ibid. No. 220 : p. 5*).

The author retracts four errors perpetrated by himself, viz. (1) he has spoken on the genetical controversy as an individual rather than as a member of the Communist Party; (2) he has tried to find points of agreement between Mičurinism and formal genetics instead of exposing their incompatibility; (3) he has criticized Lysenko to the delight of the anti-Mičurinites: and (4) he has treated Weismannism objectively instead of inveighing against its errors.

*Up the flag of progressive Mičurinite biological science.*
(*Ibid. No. 225 : p. 1*).

The report by Lysenko, which has been approved by the Central Committee of the All-Union Communist Party (bolsheviks), lays down the party line in biology. It shows that Mičurin's teaching is materialist and progressive, while the teaching of Weismann, Mendel and Morgan is reactionary and idealist. Šmaljgauzen, B. M. Zavadovskiĭ, Žebrak and Dubinin are named as Soviet scientists whose rejection of reactionary bourgeois biology is half-hearted. Criticism is expressed of the Ministry for Higher Education and the Ministry of Agriculture, for past neglect of Mičurin's teaching, as developed by Lysenko. Darwinism is acceptable to Mičurinites only after the removal of some of its mistaken theories such as the Malthusian law.

*Letter by A. P. Žebrak.* (*Ibid. No. 228 : p. 3*).

The author states that, as a member of the Communist Party, he finds it necessary to withdraw from his previous position, since this has been declared mistaken by the Central Committee of the All-Union Communist Party. Till now the Communist Party has recognized two directions in Soviet genetics, and the author had therefore felt free to differ from Lysenko on certain points. The approval by the Communist Party of Mičurinism however has made this attitude no longer tenable.

Lysenko's criticism of Weismannism is supported and extracts from earlier papers by the author are cited in this connexion.

Mičurin's belief in the influence of the environment upon hereditary changes in organisms is accepted.

Breeding new amphidiploid wheat forms is based on the methods of distant hybridization and chemical intervention, and recognizes the dependence of inheritance upon external factors. Hope is expressed that this work will contribute to the furtherance of Soviet biological science.

*Editorial reply.* (*Ibid. No. 228 : p. 3*).

Žebrak's promise to further the work of Timirjazev and Mičurin is noted (cf. above). The other points in Žebrak's letter to *Pravda* are rejected. The Communist Party has not recognized at any time two directions in Soviet genetics. Žebrak has not criticized but has supported Weismann, Mendel and Morgan. He has not used Mičurin's methods in his work, nor has he appreciated them. Žebrak avoids questions relating to the struggle with Morgano-Mendelism and seeks to compromise Mičurinite teaching with Morganism. Finally, Žebrak's achievements in his own field of work are disclaimed.

*Resolution of the Praesidium of the U.S.S.R. Academy of Sciences of 26 August, 1948, concerning the present position and the future tasks of biological science at the various institutes of the academy.*

(*Ibid. No. 240 : p. 1*).

The Praesidium of the Academy resolves that:—

(1) L. A. Orbeli shall be released from his duties as Academician-Secretary of the Division of Biological Sciences. Academician A. I. Oparin will take over his duties until a new Academician-Secretary is elected by the full assembly. T. D. Lysenko shall become a member of the Bureau of the Division of biological sciences.

(2) Šmaljgauzen is released from his duties as Director of the Severcov Institute of Evolutionary Morphology.

(3) The Cytogenetical Laboratory of Cytology, Histology and Embryology, headed by N. P. Dubinin, shall be abolished as unscientific and useless. The Laboratory of Botanical Cytology at the same institute shall be closed down on the grounds that it has followed the same incorrect and unscientific line. The Phenogenetic Laboratory shall be abolished at the Severcov Institute of Evolutionary Morphology.

(4) The Bureau of the Division of Biological Sciences shall be charged with the preparation of plans for scientific research work for the years 1948–50. In this the bureau shall be guided by Mičurin's teaching, and shall adjust the scientific research work of biological institutes to the needs of national economy.

(5) The Editorial Council and the Division of Biological Sciences shall be charged with the preparation, during the period 1948–1949, of a publication of Mičurin's scientific biography in the series *Klassiki Nauki* (*Scientific Classics*).

(6) The composition of Scientists' Councils at biological institutes and editorial boards of biological publications shall be checked, with the object of removing from them the partisans of Morgano-Weismannite genetics and of replacing them by supporters of progressive Mičurinite biology.

(7) The Division of History and Philosophy shall be charged with inclusion in its programme of popularization of the achievements of Mičurinism and of critical exposure of the pseudo-scientific Morgano-Weismannite tendency.

(8) The Bureau of the Division of Biological Sciences shall be charged with the revision of the working programmes and the composition of the scientific personnel at biological institutes. The Bureau shall produce within a month a project for the reorganization of the Severcov Institute of Evolutionary Morphology, and of the Institute of Cytology, Histology and Embryology.

(9) The Editorial Council shall revise, within a month, the existing plans for publications with the object of securing the publication of works on Mičurinite biology.

(10) The Division of Biological Sciences shall call in October 1948 an extensive session devoted to the problem of promoting Mičurinism. Every branch of the Academy shall participate.

(11) The Bureau of the Division of Biological Sciences shall revise the syllabuses at biological institutes, bearing in mind the interests of Mičurinism.

(12) A full report of the extended conference of the Academy's Praesidium shall be published in the next issue of *Vestnik Akademii Nauk* (*Proceedings of the Academy of Sciences*).

The text of the resolution offers explanation of some of the measures taken and some additional information. At a number of Academy institutes formal genetics has not been combated with sufficient vigour. For this the Praesidium of the Academy takes the blame. The Bureau of the Division of Biological Sciences and its head L. A. Orbeli have failed to give a correct orientation to the work of the biologists of the Academy.

The report by Lysenko (cf. above), which has been approved by the Central Committee of the All-Union Communist Party (bolsheviks), has exposed the scientific inconsistency of the reactionary idealist theories of the followers of Weismannism, Šmaljgauzen, Dubinin, Žebrak, Navašin and others.

*(Ibid. No. 240 : p. 1).*
*(Letter to Comrade I. V. Stalin).*

A pledge is here given by the Praesidium of the U.S.S R. Academy of Sciences to further Mičurin's biology and to root out unpatriotic, idealist, Weismannite-Morganist ideology.

*(Ibid. No. 240 : p. 1).*
*(To the prosperity of our progressive science).*

Mičurin's materialist direction in biology is the only acceptable form of science, because it is based on dialectical materialism, and on the revolutionary principle of changing Nature for the benefit of the people. Weismannite-Morganist idealist teaching is pseudo-scientific because it is founded on the notion of the divine origin of the world and assumes eternal and unalterable scientific laws. The struggle between the two ideas has taken the form of the ideological class struggle between socialism and capitalism on the international scale, and between the majority of the Soviet scientists and a few remaining Russian scientists who have retained traces of bourgeois ideology on a smaller scale. There is no place for compromise. Mičurinism and Morgano-Weismannism cannot be reconciled.
Šmaljgauzen, Dubinin, Žebrak and Navašin are named as Soviet scientists with undesirable views.

2001. 575.1(48.5)
63.00.15(48.5)

Lunds Universitets Årsberättelse 1946–1947. **(Annual Report of Lund University 1946–1947).**
Lund 1948 : Pp. 95.

Generous grants were received for the erection of various research institutes, for the extension of the University buildings and for higher education, including grants for special studies.
H. Nilsson reports on the work of the Botanical Institute and the Botanic Garden.
A. Müntzing records the activities of the Genetics Institute. As in previous years the botanical experimental material was grown mainly at Svalöf in collaboration with the Swedish Seed Association (Abst. 617). The Institute also had the use of some ground at Lund for experimental research.
Courses were held in cytological technique, the general theory of inheritance, and the statistical study of variation.

2002. 575.1:007

**Herbert Spencer Jennings. April 8, 1868–April 14, 1947.**
Genetics 1948 : **33** : 1–4.

This obituary gives an account of the work of H. S. Jennings on the genetics of the Protozoa and of his contribution to the general field of modern genetics.

2003. CATCHESIDE, D. G. 575.1:53

**Genetic effects of radiations.**
Advances Genet. 1948 : **2** : 271–358.

A comprehensive review is given of investigations on the genetic effects of radiations upon plants and *Drosophila*. The bibliography contains 381 references.

2004. 575.1:575:633(48.5)
633.42:575.127(48.5)
575.243:576.356.5

MÜNTZING, A.
Den teoretiska genetiken och växtföradlingen. **(Theoretical genetics and plant breeding).**
Försök och Forskning 1946 : **3** : 102–05.

On the occasion of the 60th anniversary of the Swedish Seed Association, Professor Müntzing gave a lecture at the Genetics Institute of Lund University in which he reviewed the development of plant breeding and genetics with special reference to recent research on mutation and polyploidy.

In discussing the production of new crops, mention was made of the work on rye-wheat, and synthetic types obtained by crossing rape with turnip rape, turnip rape with black mustard and white mustard with oil radish, as well as completely new forms of rape and *Brassica juncea* which it is hoped to obtain in the near future. Hybridization between the natural and synthetic forms has given promising results and the work is now being pursued on a larger scale.

Another problem of theoretical and practical interest is the study of the effect in cross-pollinated plants of group crossing of populations that are not inbred and of inbred lines belonging to different generations. This work is concerned mainly with the problem of degeneration due to inbreeding and the effect of group crossings. In this connexion investigations on inbreeding in diploid and tetraploid Stål [Steel] rye which has just been begun are promising.

2005. Fox, A. S. 575.1:615.36
**Antigenic differences between mutant strains of *Drosophila melanogaster*.**
Genetics 1948 : **33** : 104–05. (Abst.).

Antigenic differences between strains of *D. melanogaster* are reported, which in the case of unrelated stocks are thought to be due to multiple genic differences.

2006. Heston, W. E. 575.1:616–006
**Genetics of cancer.**
Advances Genet. 1948 : **2** : 99–125.

Recent investigations which have bearing upon the genetics of cancer are reviewed.

2007. Rife, D. C. 575.11
**Simply inherited variations in *Coleus*.**
J. Hered. 1948 : **39** : 85–91.

The inheritance of leaf colour, leaf shape and male sterility, and the occurrence of chimaeras and polyploids in *Coleus*, are described. It is pointed out that this plant should be useful in elementary courses in genetics since it shows almost all the simple types of inheritance, including simple dominance, blending, lethal factors, pleiotropy, linkage, multiple allelomorphs, male sterility, epistasis and various unusual $F_2$ ratios.

2008. 575.11:519.24
Dojmi Delupis, S. 633.63:575:578.08(45)
Eredità e selezione delle sementi. **(Heredity and seed selection).**
Tabacco 1948 : **52** : 162–77.

The author emphasizes the discontinuity of organic types—species, races, varieties, etc.—which is a direct result of the discontinuity of the elements conditioning the hereditary qualities, the genes. This discontinuity applies even to quantitative characters such as sugar content, root weight, etc. in sugar beet and is compared with the quantum principle in atomic physics. Each character is seen as a series of deviations from the normal, through an intermediate stage and in place of the common symbols $AA$, $Aa$, $aa$ the following pairs of relationships are used:—

$$i = c\,(k - l) \qquad (1)$$

$$j = c\,(l - m) \qquad (2)$$

where $k = l + m$ and $c$ is a constant of a given measurable magnitude. The results of experiments show that $k + m$ are fixed values, whole multiples of a basic quantity, whilst $l$ varies according to a formula of a type analogous to the general formula for spectral lines, attaining a maximum which is also a whole multiple of the same unit. Thus each system is represented by a triad of numbers, $k$, $l$, and $m$ which correspond to a series of values or intensities which may be assumed by the character considered. Moreover, when $l$ is fixed, $m$ can assume the successive values 1, 2, 3.... up to $l-1$, which is the maximum value compatible with a given $l$; $k$ assumes the corresponding values $l + 1$, $l + 2$..... It has been shown experimentally that intensities in which a system expresses itself are given by the equation (2) for any magnitude. The triads $k$, $l$ and $m$ and thus the intensities of the values are determined experimentally by measuring the values considered simultaneously with the refractive index of the sap of a given organ, the refractive index being in definite relation with equation (1). These pairs of equations are substituted for the simple letters *Aa*, *aa* etc. in the Mendelian scheme and the linear combination (addition) of the expressions of a pair of systems gives the expressions of the character in the progeny. The resulting systems will be disposed in two opposite fields, with a lacuna between; they will in other words be discrete and segregation will have taken place.

In the case of simple dominance say of tall over short, there are two systems, having in common $l = 3$ as the maximum value and $k$ and $m$ equal to 4·1 and 5·2 respectively. In the progeny only one system results, as the other = 0 and is thus "prohibited". The actual physical form attained will vary with the environment but will approximate to the taller parent. The offspring, having $l = 4$ in common, can assume successive values of $m = 1, 2, 3$ and corresponding successive values of $k = 5, 6, 7$. The pairs of equations corresponding to these successions of numbers, are three, for which six combinations are possible, of which two are "prohibited" and four "permitted", which again corresponds to the Mendelian system. When the values of $l$ are increased, a complex system results which corresponds to the ordinary distribution curve, which is shown to derive from linear combination between the pairs of relationships corresponding to a given genealogical group. The two types of contrasting intensities of expression of a particular character into which a hybrid population segregates are determined by the application of the principle which establishes the linear combination of the equations corresponding to the triad of numbers characterizing the single individuals. One can recognize the possible combinations and which are "permitted" and which "prohibited" in such a way as to include the undesirable in the latter group and the desirable ones in the former. The rule for recognizing the two contrasting types of intensity into which a hybrid population segregates is applied by arranging the forms corresponding to the different triads in succession of the values of $l$ in whole numbers along the same row and in succession of the values of $m$ along the same column and calculating the frequency distribution of the forms divided into classes according to successive whole numbers of $m$. In this way limiting values for the triads are fixed and these probably coincide with the limits of segregation and serve as points of reference for separating the individuals to be selected on the one hand and on the other discarded. According to these values forms are also chosen which are as far as possible complementary, and when crossed together will give the maximum degree of heterosis. These are grown in pairs for seed production.

Having proved successful in breeding sugar beet, the method is now being applied to breeding types of *Nicotiana rustica* combining high yield and nicotine content.

2009. 575.11:577.15:632.3
575.3:577.15:632.3
575.11:577.15:632.422.3
575.3:577.15:632.422.3

MONOD, J.

**The phenomenon of enzymatic adaptation and its bearings on problems of genetics and cellular differentiation.**

Growth 1947 : **11** : 223–89.

Among other things, the role of genes in enzymatic adaptation and the segregation of the genes concerned are discussed with special reference to bacteria and yeast, and the possibility that gene mutations may play a significant part in irreversible cell differentiation is considered.

2010. BLAKESLEE, A. F. and
STANLEY, G. S. 575.11.061.6:581.192

**Pigments of yellow-eyed races of black-eyed susan (*Rudbeckia hirta*).**

Science 1948 : **107** : p. 458.

Two morphologically indistinguishable mutants of *R. hirta* which have yellow instead of purple floral cones are known as Black Yellow and Red Yellow. The former has the genetical constitution *by RY* and the latter *BY ry* and *by ry* whereas the purple coned type has the constitution *BY RY*.

The chemical differences between the cones of these different types of plants are indicated and it is explained how one step in the production of cyanidin, which is found in the purple cones, is blocked by the substitution of *ry* for *RY* and another by the substitution of *BY* by *by*.

2011. DUBININ, N. P. 575.11.061.6:581.192
**(On the inheritance of biochemical properties which influence flower coloration).**
Uspehi Sovremennoĭ Biologii (Advances in Modern Biology) 1946 : **21** : 341–56.

A review is given of the data of Onslow, Scott-Moncrieff, Lawrence, Robinson and others on the relationship between molecular structure and colour in the various groups of plant pigments and on the relationship of this molecalar structure to certain known genes. The results show that different genes affect the process of pigment synthesis at different stages; that genes may keep their capacity to produce a given effect through a succession of generations even when present in a genetical substrate where this effect is not manifested; that the effect of the genes is quantitive as shown by their behaviour in polyploids; and that the wild type corresponds generally to the most complex molecular structure and the mutants to more simplified structure though exceptions to this general rule occur and are discussed.

2012. 575.113.6:575.12:575.115
575.182
HIORTH, G.
Über das Vorkommen von Hemmungsgenen in Inzuchtlinien von *Godetia Whitneyi*. **(On the occurrence of inhibiting genes in inbred lines of *G. Whitneyi*).**
Züchter 1946 : **17/18** : 69–78.

Inhibitory phenomena were studied in crosses of the standard line Bre (Bremen), derived from garden races, with certain lines from three Californian localities. Special mention is made of a maternal after-effect of one of the six inhibiting genes and of a similar, weaker effect from the pollen.

Further investigation was made of inhibitory phenomena also in race hybrids.

The inhibiting genes, which have been established by the author, are potentially dominant, in that being already heterozygotic in combination with their complementary factors they produce their effect. A relevant problem suggested for investigation is, whether potentially dominant mutations very often occur in nature but remain concealed, since the complementary genes necessary for their effectiveness are absent. E. W.

2013. LEWIS, E. B. 575.116.1:001.4
**Pseudo-allelism in *Drosophila melanogaster*.**
Genetics 1948 : **33** : p. 113. (Abst.).

Pseudo-allelism is characterized by the presence of closely linked genes, which appear to act developmentally as one. Two new cases of pseudo-allelism have been found in *D. melanogster* by using special methods of increasing crossing-over. The mutants *bx* and $bx^3$ (locus 3·58·8) are pseudo-allelic to the dominant gene $bxd^D$, formerly designated $bx^D$, the order being $bx$–$bxd^D$. The recessive mutant $sbd^2$, formerly termed $Sb^{r2}$, is pseudo-allelic to *Sb* (locus 3–58·2) in the order $sbd^2$–$Sb$. It is suggested that pseudo-allelism may be a widespread phenomenon.

2014. LINDSTROM, E. W. 575.116.1:575.42
**The inbreeding "freeze" of linked genes and its relation to internal chromosome balance of polygenes.**
Genetics 1948 : **33** : p. 114. (Abst).

This is an abstract of a paper presented in 1947 at a meeting of the Genetics Society of America. Formulae were given for the "freeze" due to the action of linkage in continuous self-fertilization (*cf. Plant Breeding Abstracts*, Vol. XVII, Abst. 1636), and the limitation of selection produced by linkage was discussed. It was pointed out that the depressing effects of inbreeding are much more marked in a naturally cross-fertilized species such as maize, in which the intrachromosomal balance of polygenes is poor, than in a self-fertilized species such as the tomato, in which a higher degree of the intrachromosomal polygenic balance exists. Any inter-chromosomal action of polygenes is likely to be additive, and the problems of selection for polygenes on different chromosomes should be similar in both types of species.

2015. Hinton, T. and
Goodsmith, W. 575.116.1:576.312.31
**Cytological analysis of factors affecting a position effect.**
Genetics 1948 : **33** : p. 108. (Abst.).

Investigations on the position effect designated Plum colour of the eye in *Drosophila melanogaster* are reported. In one case the results of crosses between different stocks indicated that only the chromatin involved in a chromosomal aberration was responsible for a phenotypic alteration of the position effect Plum colour.

2016. Hinton, T. 575.116.1:576.312.341
**An analysis of rearrangements of chromosomal aberrations producing position effects.**
Genetics 1948 : **33** : p. 108. (Abst.).

Specimens of *Drosophila melanogaster* carrying $bw^D$ or *In*(2*LR*) 40*d* were irradiated. Both these stocks have a phenotype dependent upon a chromosome aberration. Individuals in the progeny of the irradiated parents were found with an alteration of the original chromosome arrangement. It was possible to correlate the new arrangements with the phenotypic change due to position effect, and position effect with the position of the heterochromatin.

2017. Crow, J. F. 575.125:575.115
**A consequence of the dominance hypothesis of hybrid vigor.**
Genetics 1948 : **33** : 101–02. (Abst.).

It has been demonstrated that the expected decrease in selective advantage of a population due to a detrimental recessive factor is equal to the mutation rate to that factor, and is independent of the selective disadvantage of the gene itself. The total loss in selective advantage due to additive detrimental recessive factors is represented by the product of the number of loci and the average mutation rate; a general estimate of this loss is given as 5%; according to the dominance theory of hybrid vigour this would be the maximum difference in selective advantage between a random mating population and a hybrid. For greater increases in hybrid vigour other explanations appear to be necessary, such as the interactions of factors and the superiority of heterozygous loci over homozygous in their effect upon the expression of hybrid vigour.

2018. 575.127.2:581.162.5
Hiorth, G. 576.16
Zur Genetik des Artbastardes *Godetia amoena* x *G. Whitneyi*. **(On the genetics of the species hybrid *G. amoena* x *G. Whitneyi*).**
Züchter 1947 : **17–18** : 109–21.

This is a detailed genetical and cytological study of basal spotting of the flower of *G. amoena* and *G. Whitneyi* and their hybrid, as a contribution to the general problem of interspecific sterility. The bearing of the results on species formation is indicated and a genetical method of analysing a cultivated species, when its genotype contains genes derived from other species, is suggested. E. W.

2019. Caspari, E. 575.182
**Cytoplasmic inheritance.**
Advances Genet. 1948 : **2** : 1–66.

A comprehensive review is given of the literature on cytoplasmic inheritance under the following headings: criteria for the establishment of cytoplasmic effects; the constancy of the plasmon, as shown by a cytoplasmically inherited pollen sterility in maize, cases of cytoplasmically controlled pathogenicity in rusts, and other examples; the phenotypic action of the plasmon; the frequency of occurrence of cytoplasmic differences; plasmon and genic action; the mechanism of the inhibition of plasmon-sensitive genes; the influence of the plasmon on the genome; the relation of plasmon and cytoplasmic constituents; and plasmon and evolution. The author defines plasmon as a term for the stable properties of the cytoplasm which may be transmitted to the offspring.

2020. 575.182:576.356:581.143.24
576.356.4:581.143.24

MATHER, K.

**Significance of nuclear change in differentiation.**

Nature, Lond. 1948 : **161** : 872–74.

The nuclear changes which sometimes accompany the differentiation of cells are discussed under the headings changes of elimination, changes of replication and changes of manifestation.

Changes of elimination involve specific whole chromosomes or specific parts of chromosomes. Most cases of it are known in the Diptera. There is however one case in the plant kingdom; in *Sorghum* the supernumerary chromosomes vanish from the nuclei of the cells which will form the root but remain in at least some of the shoot cells. It appears that elimination causes a difference between the nuclei of the somatic cells and those which will give rise to the sex cells. In *Ascaris* and probably in *Sorghum* the chromosomes which are eliminated are heterochromatic and hence presumably lack major genes.

Changes of replication are nearly always non-specific; involving all the chromosomes equally. The chromosomes divide more often than the nucleus, thus giving rise to polyploid or polytene nuclei according to whether or not the centromeres divide. These two types of nuclei are classed together as endopolyploid. Sometimes the nucleus may divide without the cell doing so and a multinucleate cell or coenocyte is formed. Replication is found in insects and is fairly common in plants, particularly, it seems, in cortical tissues. The reverse process which must be tantamount to somatic meiosis appears to occur but less commonly, e.g. in roots of onion and barley after treatment with growth substances. There are a few cases of replication confined to specific chromosomes.

Changes of manifestation strictly involve no alteration in the number or balance of the genes. A typical example is the different rates of condensation of the chromosomes in the two daughter nuclei resulting from the first division in pollen grains. The difference is thought to be due to a cytoplasmic gradient. Changes of manifestation may be associated with change of another kind.

The significance of these changes with respect to the differentiation of cells is considered. It appears from the results obtained by asexual propagation that in plants, with the exception of occasional polyploidy, the cells and tissues are genetically alike. Nor can polyploidy or endopolyploidy be regarded as a type of change likely to cause differentiation. Elimination is closely associated with differentiation and may sometimes cause it but a more general cause must still underlie most tissue differences. It is pointed out, too, that any explanation which attributes differentiation to elimination or multiplication and does not explain the nuclear change itself is incomplete, and that the answer is to be sought in changes of manifestation.

There is now a wide range of evidence to show that the behaviour of a cell is immediately dependent, not on its nucleus, but on its cytoplasm which may be acting in a manner reflecting the nucleus of a past association between nucleus and cytoplasm, not the present one. Thus a nucleus, though remaining constant in its genetic content, can have a changing effect. It is argued that co-ordination of nuclear activity in different cells must be brought about by the cytoplasm, which is connected by cytoplasmic connexions, and that the cytoplasm can, in its regulation of nuclear processes, reflect the action of a gene no longer present in the nucleus. It is concluded that differentiation depends not on gene changes in the nucleus but on the physiological reduction or enhancement of gene action by the constitution of a cytoplasm itself reflecting the earlier action of these same genes.

2021. 575.182:581.02
575.182:581.143.24

SONNEBORN, T. M.

**Genes, cytoplasm and environment in the control of cellular heredity.**

Science 1948 : **107** : p. 459.

In *Paramecium* the hereditary traits which can characterize a line of descent are determined by genes, but which of these possible traits actually characterize any line of descent depends on cytoplasmic determinants. The environment also comes into play, e.g. in determining the outcome of competition between different plasmagenes. Since higher organisms arise from eggs in which the cytoplasm is relatively undifferentiated the latter ordinarily plays an insignificant role in heredity but may, it is thought, be significant in histological differentiation.

## VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

2022. SPENCER, W. P. 575.22 575.41
**Genetic drift in a population of *Drosophila immigrans.***
Evolution 1947 : **1** : 103–10.

*D. immigrans* is an introduced species into the United States, and forms "island" populations in villages, towns, or even around isolated human habitations. The analysis of two samples of equal size taken in a Western Pennsylvania village at the same season of the year and in the same way, but separated by a distance of nearly a quarter of a mile, showed that the genes of "stubble" bristles and "brick" and "dubonnet" eye colours occurred with a relatively high frequency. The concentration of these genes in this island population is attributed to genetic drift due to seasonal fluctuations in population size, rather than to high mutation frequency or selective advantage. The role of the interaction of genetic drift with selection in establishing favourable adaptive combinations is discussed.

2023. MOODY, P. A. 575.22:578.08
**A simple model of "drift" in small populations.**
Evolution 1947 : **1** : 217–18.

A model is described, consisting of wooden beads of two colours, which simulates reduction of variability in small bisexual populations through the operation of the laws of chance upon (1) matings and (2) subsequent production of zygotes.

2024. STALKER, H. D. and CARSON, H. L. 575.22:581.036 575.41:576.356.2
**Morphological variation in natural populations of *Drosophila robusta* Sturtevant.**
Evolution 1947 : **1** : 237–48.

Studies of geographical variations in the morphology of *D. robusta*, based upon data on 45 strains from 22 widely separated localities in the eastern United States, have revealed the occurrence of north-to-south morphological clines which are significantly correlated with average annual temperature. The morphological clines show a general correspondence with the north-to-south gradients of chromosome inversion frequencies found in this species (cf. Abst. 2039).

2025. DUBININ, N. P. 575.24:575.17
**(On the evolution of mutability and its sources in natural populations).**
Uspehi Sovremennoĭ Biologii (Advances in Modern Biology). 1947 : **23** : 431–44.

A review of the literature on the subject shows that lines of high mutation frequency are found in the most widely distant areas, in *Drosophila melanogaster* and in other organisms studied. However, the normal mutation rate of genes is found to be approximately the same in the widest possible range of organisms, though there is some evidence that the mutation rate may be increased by interspecific crossing. The author's own observations, together with an examination of the data of other authors, seem to indicate that the mutation rate in *D. melanogaster* and *D. pseudoobscura* is substantially the same all over their areas of distribution at least for the majority of genes. This in turn suggests that mutation is a process intimately connected with the molecular structure of the gene or the chromosome. Unpublished data are referred to which show that spontaneous structural changes in *D. funebris* chromosomes are more frequent in the vicinity of existing translocations than elsewhere.

2026. **Wallace, R. H.,**
**Bushnell, R. J.** and 575.243:534.39
**Newcomer, E. H.** 576.356:534.39
**The induction of cytogenetic variations by ultrasonic waves.**
Science 1948 : **107** : 577–78.

Morphological and nuclear changes including various kinds of chromosomal aberrations in *Helianthus* shoot tips, and changes including mutations of both lethal and visible types in young adults of *Drosophila melanogaster* resulted from treatment in an intense ultrasonic field generated by a piezo-electric instrument with an output of approximately 150 watts acoustic in the zone where the material was exposed. The vibration frequency used was 400,000 per second. Root tips of *Allium* and *Narcissus* were also treated, and more detailed accounts of the investigations are to be published later.

2027. **Kaufmann, B. P.** and 575:243:537.531:537.61–15
**Gay, H.** 575.243:537.61–15:581.04
**The modifying action of near infrared radiation on the frequency of induced gene and chromosomal changes in *Drosophila melanogaster*.**
Genetics 1948 : **33** : p. 112. (Abst).

The completion is reported of a lengthy series of experiments on *D. melanogster* to determine the effect of near infra-red radiation, when used before or after X-ray treatment, on the frequency of production of recessive lethals, dominant lethals and chromosomal rearrangements (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 113 and Vol. XVIII, Absts 38, 39). Near infra-red radiation alone does not induce any changes; when used in conjunction with X-rays it effects a marked increase in the frequency of chromosomal rearrangements, but not of lethals. The production of lethals is not therefore necessarily dependent upon chromosomal rearrangement. The results suggest that near infra-red radiation acts as a sensitizing agent by increasing recombination among the potential breaks induced by ionizing radiations. The effectiveness of near infra-red radiation in increasing the frequency of chromosomal rearrangements when applied in conjunction with nitrogen mustards is now being studied.

2028. **Spencer, W. P.** and
**Stern, C.** 575.243:537.531:578.08
**Experiments to test the validity of the linear r-dose/mutation frequency relation in *Drosophila* at low dosage.**
Genetics 1948 : **33** : 43–74.

Investigations on the induction of mutation in *Drosophila* by X-rays of various wave lengths, radiations of radium, neutrons and ultra-violet light have established a general linear relationship between dosage expressed in r units, and mutation rate. Experiments are reported on the relationship between dosage and the frequency of sex-linked lethal mutations in *Drosophila* treated with X-ray doses of 25 r, 50 r, 150 r, 500 r, 1000 r, 2000r, 3000 r and 4000 r. It was found from chromosome examination that with doses as low as 50 r and 25 r the linear relationship between radiation dosage and mutation rate was maintained. The data from visible mutations gave a similar result.

The implications of the findings in connexion with the exposure of individuals of the human race to low dosages of X-rays are briefly discussed.

2029. **Caspari, E.** and
**Stern, C.** 575.243:539.166:578.08
**The influence of chronic irradiation with gamma-rays at low dosages on the mutation rate in *Drosophila melanogaster*.**
Genetics 1948 : **33** : 75–95.

As a general rule it has been found that the rate of mutation induced in *Drosophila* by short wave length radiation is directly proportional to the dose of radiation, expressed in r units. This linear relationship between radiation dose and mutation rate applies to all dosages of X-rays so far tested except the highest dosages in which a "saturation effect" comes into play. For the lowest dosages W. P. Spencer and C. Stern (cf. Abst. 2028) have recently reported that the linear relationship is maintained down to a dose of 25 r. It has also been established by several investigators that at the high and medium dosages the mutation is independent of the intensity, i.e., of the time over which the application of a given number of units is spread. The present paper reports experiments carried out to determine whether or not mutation rate is independent of the time of irradiation at low dosages, the rate of lethal sex-linked mutations in flies exposed to gamma rays of 2·5 r units per day over a period of 21 days (total dose 52·5 r) being estimated. No significant differences were found between the experimental and control flies, as shown by cytological examination. This result disagrees with that obtained by Spencer and Stern (cf. Abst. 2028), by an application of a similar dose of X-rays given in a short time.

The differences between the techniques of the experiments carried out by Spencer and Stern and the authors are discussed with a view to explaining the disparity of the results. As possible causes of the ineffectiveness of the irradiation to produce mutations in the experiments described, different sensitivity of sperm at different stages of aging, and dependence of induced mutation rate of low dosages on a time factor are considered.

2030. 575.243:575.113.7:537.531:633(48.5)
575.243:575.113.7:539.185.9:633(48.5)

Akademiens sekreterare: Årsberrättelse för 1947. (**Academy of Agriculture. Secretary's report for 1947**).
K. LantbrAkad. Tidskr. 1948 : **87** : 13–29.

This report contains the following observations of some interest to plant breeders:—

Professor Å. Gustafsson's work on the breeding of cross-pollinated plants with special reference to the effect of lethal factors, as observed in X-ray mutations, seems to show that monofactorial hybrids bearing a lethal factor show more vitality than those in which a non-lethal is present.

Gustafsson's research on the production of new useful biotypes by artificially induced mutations is being promoted by funds from the Swedish Scientific Research Council [Naturvetenskapliga Forskningsrådet] and from the Wallenberg Foundation which has given a grant of 55,000 Swedish kronor. This work is being carried out in collaboration with the Swedish Seed Association at Svalöf, the Association for Fruit Tree Breeding [Föreningen för Växtförädling av Fruktträd] at Balsgård and the Association for Forest Tree Breeding [Föreningen for Växtförädling av Skogsträd] at Källstorp.

Research on fruit trees and forest trees has also been planned in co-operation with the two latter institutes. Gustafsson's progress in research on cereals, flax and soya bean has been recorded elsewhere (cf. Abst. 617).

Experiments with neutrons and mustard gas show that the former are highly effective in inducing mutations, whereas the latter causes a lower mutation frequency, and the type of mutation seems different. This finding perhaps opens up a certain possibility of controlling the direction of mutation (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1506).

2031. 575.243:576.356:537.61–15
Swanson, C. P. 575.243:576.356:537.531

**The differential effects of combined radiations on chromosome breakage and mutation rate.**
Science 1948 : **107** : p. 458.

The possibility of distinguishing between gene mutations and visible changes in the chromosomes by making use of additional agents such as infra-red combined with X-ray and ultra-violet treatment is discussed.

2032. Demerec, M. 575.243:581.04

**Mutagenic potencies of some polycyclic hydrocarbons and of some azo compounds.**
Genetics 1948 : **33** : p. 102. (Abst.).

The mutagenic action of over 20 polycyclic hydrocarbons and azo-compounds upon the sperm of *Drosophila* has been studied, using the aerosol technique (cf. Abst. 38). A considerable degree of correlation between mutagenic and carcinogenic properties has been observed.

2033. Kaplan, W. D. 575.243:581.04

**Formaldehyde as a mutagen in *Drosophila*.**

Science 1948 : **108** : p. 43.

Mutations were induced in *Drosophila* by administering sub-lethal concentrations of formaldehyde in a good medium. Lethal mutations occurred in 5·66% of the cultures obtained. No correlation was found between formaldehyde concentration and induced mutation rate. These results confirm those of I. A. Rapoport, who obtained 5.92% of lethal mutations with formaldehyde treatment.

2034. 575.247:539.185.9

Lefevre, G. (jun.) 575.247:539.166

**The relative effectiveness of fast neutrons and gamma rays in producing somatic mutation in *Drosophila*.**

Genetics 1948 : **33** : 112–13. (Abst.).

A summary is given of a paper presented in 1947 to the Genetics Society of America. The effect of $\gamma$ rays and fast neutrons upon the frequency of eye colour mosaics was studied. From the data on wild type males a mutation constant for somatic mutation at the white locus was calculated, which was of the same order of magnitude as that for germinal mutation. Neutron exposure was found to be relatively more effective per ionization in inducing somatic mutation than $\gamma$ rays.

2035. 575.247:539.185.9

Lefevre, G. (jun.) 575.247:539.166

**The relative effectiveness of fast neutrons and gamma rays in producing somatic crossing over in *Drosophila*.**

Genetics 1948 : **33** : p. 113. (Abst.).

This is an abstract of a paper presented in 1947 to the Genetics Society of America. Heterozygous white and eosin-white female larvae were exposed 24 to 30 hours after egg laying to $\gamma$ rays and fast neutrons. The frequency of resulting mosaics for eye colour was considerably higher in females than in males, and depended upon the rate at which the total dose was administered. Heterozygous females with a double inversion in one X chromosome showed no increase in the frequency of mosaics. Neutrons were relatively more effective per ionization in producing somatic mutation than $\gamma$ rays. Possible mechanisms of the induction of somatic crossing-over by radiation were considered.

2036. 575.247:581.02
575.242:632.3
575.242:632.421.9:581.192

Haddow, A. 575.182

**The mode of action of chemical carcinogens, and its possible relation to the origin of viruses.**

Growth 1947 : **11** : 339–58.

The induction of mutations in bacteria is discussed in connexion with the induction of tumours by carcinogenic agents. It is thought there might be some similarity between the two classes of phenomena, and that cancer cells probably arise and begin to proliferate as mutants adapted to special conditions which impair the growth of normal cells. The presumed somatic mutations involved in causing cancer are compared also with biosynthetic mutations in *Neurospora*, and the nature of the former is discussed. It is suggested that the agent of the Rous sarcoma of chickens may be a plasmagene comparable to kappa in *Paramecium aurelia*.

## SELECTION 575.4

2037. Dobzhansky, Th. and
Spassky, B. 575.41:575.24

**Evolutionary changes in laboratory cultures of *Drosophila pseudoobscura*.**

Evolution 1947 : **1** : 191–216.

Laboratory experiments were carried out on *D. pseudoobscura* to test the hypothesis that mutations beneficial to their carriers may be observed if, instead of normal or wild type strains, the initial experimental material consists of strains whose vitality is reduced by deleterious genes. Seven strains were made homozygous for a given second and fourth chromosome, known to contain recessive factors influencing the viability of the homozygotes. Some of these recessive factors also slowed down the rate of development, reduced the fertility, or rendered the homozygotes structurally abnormal. Each strain was subdivided into four lines, two of which were kept homozygous, and two were kept "balanced," i.e. the second or fourth chromosome was maintained in a heterozygous condition. The homozygous, but not the balanced, lines were kept in strongly over-populated and crowded cultures. In one homozygous and one balanced line of each strain, the males were given a treatment of 1000 units of X-rays in each generation; the whole experiment lasted for 50 generations. The behaviour of the homozygous lines treated with X-rays was qualitatively similar to that of the untreated ones. In both series of experiments, improvement in the viability of the homozygotes and a speeding up of their rate of development were most frequently observed. The behaviour of the treated and untreated balanced lines was also qualitatively similar. The prevalent change observed was deterioration; the change was more marked in the X-ray treated lines than in the untreated. The changes observed in the homozygous lines are attributed to the action of natural selection upon mutations producing improvements in viability. The changes observed in the balanced lines are attributed to mutation, and the controlling influence of genetic drift upon mutation, so that deleterious recessive mutants were accumulated, regardless of their non-adaptive values.

2038. Carson, H. L. and
Stalker, H. D. 575.41:576.312(73)
**An altitudinal transect of gene arrangement frequencies in *Drosophila robusta.***
Genetics 1948 : **33** : p. 100. (Abst.).

Altitudinal clines in the frequencies of certain chromosomal arrangements in *D. robusta* were compared with the clines in the frequencies of these arrangements in the broad geographical range of the species in the United States. The altitudinal and geographical clines were similar only in two cases of chromosomal arrangement. In other cases no such similarity could be found, while in a number of cases, the altitudinal cline showed a reversal of that expected according to the geographical cline. These inconsistencies are to be expected if other ecological conditions besides temperature are taken into consideration as effective factors in selection; it is also suggested that a given chromosomal region in fly populations from widely scattered parts of the geographical range of the species may vary in its genic content, and thus also in its selective value.

2039. Carson, H. L. and 575.41:576.356.2
Stalker, H. D. 575.22:576.356.2
**Gene arrangements in natural populations of *Drosophila robusta* Sturtevant.**
Evolution 1947 : **1** : 113–33.

The salivary gland chromosomes of *D. robusta* are described. Inversions were found in all chromosome arms, except in the small fourth chromosome. Most of the inversions are widespread throughout the range of the species in the eastern United States; north-to-south clines in the frequencies of the inversions were detected. The pattern of the geographical distribution of the inversions is discussed, and an attempt is made to relate the present-day distribution with the presumed past history of the species.

2040. Dobzhansky, Th. and 575.41:576.356.2
Epling, C. 576.356.2:575.123:575.116.1
**The suppression of crossing over in inversion heterozygotes of *Drosophila pseudoobscura.***
Proc. Nat. Acad. Sci. Wash. 1948 : **34** : 137–41.

Observations and experiments on natural and artificial populations of *D. pseudoobscura* have shown that within a given population flies which are inversion heterozygotes with regard to the third chromosome may possess a higher adaptive value than those which are inversion homozygotes (cf. Abst. 2042). In other populations the inversion homozygotes appear to have the selective advantage. The possible genetical mechanisms which could bring about the adaptive differences between and among the inversion homozygotes and heterozygotes are discussed.

The experiments reported show that heterozygosis for inversions in the third chromosome in natural populations of *D. pseudoobscura* reduces the frequency of recombination of genes located in the chromosome to a small fraction of the normal value. Recombination is strongly prevented not only for genes within the inverted sections, but also for those which lie between the centromere and the inversion, and between the inversion and the free end of the chromosome. Inversion is therefore an effective means of maintaining gene combinations which confer upon their corresponding characters superior adaptive properties.

2041. Ives, P. T. 575.41:576.356.2

### Second chromosome inversions in wild populations of *Drosophila melanogaster.*

Evolution 1947 : **1** : 42–47.

Studies have been made on the inversions in chromosome II of wild populations of *D. melanogaster* collected in orchards at South Amherst, Mass., in 1938, 1941 and 1945. Details of the characteristics of the collections made in 1938 and 1941 have already been published (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 889). The frequency of inversions was the same in 1938 and 1945; taking the combined data the frequency was 8% in 275 chromosomes. Non-lethal chromosomes contained as many inversions as lethal. No inversions were found in a total of 1670 control tests in the laboratory. The inversions were distributed evenly between the two arms of the chromosome, and consisted of only two inversions, one for each arm. Since the inversions are present in the natural populations in too large a frequency to have accumulated as random mutations, it appears that the two inversions represent alternative gene sequences which at one or more points in the annual cycle of environmental conditions existing in the area have a selective advantage over the standard gene sequence. Examination of data on the distribution of inversions in the second and third chromosomes of wild populations of *D. melanogaster* in North America and Russia indicates that the evolutionary trend as regards these chromosomes is different in the two continental areas.

2042. Dobzhansky, Th. 575.41:576.356.2:575.123

### Adaptive changes induced by natural selection in wild populations of *Drosophila.*

Evolution 1947 : **1** : 1–16.

Seasonal cyclic changes in the genetic composition of wild populations of *Drosophila pseudoobscura* as shown by the frequencies of different gene arrangements in the third chromosome are described, which are the result of natural selection (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1390).

An account is given of experiments in which some of the changes taking place under natural conditions have been reproduced in population cages (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1154). The relative proportions of chromosomes with different gene arrangements remain constant in population cages kept at 16·5° C. Changes are frequently observed in cages kept at temperatures above 20° C.; the incidence of some gene changes increases, while the incidence of others decreases. Usually an equilibrium is reached in which all gene arrangements present in the initial population of an experimental cage are retained, but often with frequencies very different from the initial ones. The inversion heterozygotes possess the highest adaptive value, while the inversion homozygotes are relatively inferior in survival and reproduction.

Population cage experiments have also shown that chromosomes with the same gene arrangement but in flies of different geographical origin may behave differently.

The balanced polymorphism, resulting from the superiority of the heterozygotes over the corresponding homozygotes, permits the species to react adaptively to changes in its environment, and at the same time the store of hereditary variability is not depleted.

The superior adaptive quality of the inversion heterozygote is discussed in relation to the classical theory of heterosis that the restoration of vigour following intercrossing of inbred lines is due to the masking of deleterious recessives by favourable dominant genes.

2043. Reed, S. C. and
Reed, E. W. 575.41:578.08
**Natural selection in laboratory populations of *Drosophila*.**
Genetics 1948 : **33** : 121–22. (Abst.).

The use and advantages of a new type of population cage for *Drosophila*, known as the population bottle, are described. The competitive interactions of different genotypes have been studied by this method. It was found that both natural selection and genetic drift worked extremely rapidly in populations of less than 500 flies.

## ORIGIN OF SPECIES 576.1

2044. Matveiev, B. S. [Matveev, B. S.] 576.12
**(Darwin's law of hereditary transmission at a corresponding age and its role in evolution).**
Bjulletenj Moskovskogo Obščestva Ispytateleĭ Prirody (Bull. Soc. Nat. Moscow) **1946 : 51** : No. **6 : 3–18.**

Studies of the development of scales, hairs and analogous organs in certain fishes and mammals show that hereditarily similar embryological structures may give rise to different organs according to the time at which they develop. Shifts in the time of development in adaptive features are shown to be a powerful factor in natural selection and the views of Darwin and other investigators on the subject are analysed. In the majority of cases earlier initiation leads to a more complex and more adaptive organ and hence in general has a positive selection value.

2045. Jepsen, G. L. 576.12:575.1:56
**The Princeton University Bicentennial Conference on Genetics, Paleontology, and Evolution.** 1948 : Conf. 3 : Ser. 2. Pp. 36.

The addresses and discussions held in 1946 at the Princeton University Bicentennial Conference under the title *Genetics, Palaeontology and Evolution* are summarized. The subject of the sessions and the principal speakers included: Time in earth history, Principal speaker A. Knopf; Gene and character, C. Stern; Gene and mutation, A. H. Sturtevant; Trends of evolution in animals, A. A. Romer; Trends in evolution in plants, R. W. Chaney; Rates of evolution in animals, G. G. Simpson; Rates of evolution in plants, G. L. Stebbins; Man's evolution: past and future, J. B. S. Haldane. A National Research Council Committee on Common Problems in Genetics, Palaeontology and Systematics had been working towards a synthesis of biology and geology from the evolutionary point of view, and the Conference provided the opportunity of broadening the discussion of this Council.

2046. Khokhlov, S. S. [Hohlov, S. S.] 576.12:581.163
**Historical conditions and evolutionary significance of apomixis in angiosperms.**
C. R. (Doklady) Acad. Sci. U.R.S.S. 1946 : **52** : 805–07.

The view is expressed that apoximis in the Angiosperms is a completion of the main evolutionary trend in the higher plants of the reduction of the gametophyte. Apomixis is regarded as a progressive and dialectical development, combining the highest form of sexual propagation, i.e. seed formation, with independence of the sexual process. Apomictic forms are not an *impasse* of evolution, it is suggested, but transitory forms portending the evolution of a new type of plants which may be termed the Agameospermae.

2047. Mayr, E. 576.16
**Ecological factors in speciation.**
Evolution 1947 : **1** : 263–88.

The hypothesis of geographical speciation and the alternative hypothesis of ecological or sympatric speciation are examined. The author reaches the general conclusion that many of the assumptions involved in the theory of sympatric speciation are erroneous, and that the evidence usually cited in support of sympatric speciation is fully consistent with the theory of geographical speciation.

2048. EPLING, C. 576.16:575.127.2(79.4)
**Natural hybridization of *Salvia apiana* and *S. mellifera.***
Evolution 1947 : **1** : 69–78.

The effects of natural hybridization between *S. apiana* and *S. mellifera* are described, as the result of a study in California. Although sufficient compatibility exists between the two species to permit the frequent formation of localized hybrid swarms, it appears that the constancy of the species is maintained. This maintenance is probably due to a combination of isolating mechanisms operative in a community in which the norm of succession is not modified to any considerable extent. The production of $F_1$ hybrid individuals is limited by distance, colonial habit, ecological factors, structural differences in the flower in relation to the pollinating insects, and by partial seasonal isolation. Given local changes in the environment, however, hybrids may appear, and under abruptly changed conditions these could have selective advantage with the result that a hybrid combination might emerge as a new specific entity.

2049. GREGOR, J. W. 576.16:581.5:575.41:582
**Some reflections on intra-specific ecological variation and its classification.**
Trans. Bot. Soc. Edinb. 1946–47 (1948) : **34** : 377–91.

The nature of the ecotype is discussed with reference to various species. Ecotypes which can exchange genes freely are thought of as belonging to the same ecospecies, while those between which gene exchange is restricted belong to different ecospecies and those incapable of exchanging genes to different coenospecies. It is suggested that genecological classification should be regarded as a special-purpose classification independent of and subsidiary to the orthodox taxonomic system.

2050. MAYR, E. 576.16:582
**The bearing of the new systematics on genetical problems. The nature of species.**
Advances Genet. 1948 : **2** : 205–37.

The review discusses the problem of the species concept with reference to some aspects of animal taxonomy, under the following headings: the results of the new systematics; the definition of species; the meaning of the species; the relation of species differences to the maintenance of isolation; difficulties of the species concept; and conclusion. The author sums up as follows: "Species are natural units characterized by their reproductive isolation from other such units. The species of the taxonomist, so far as based on morphological criteria, are merely inferences from the species in nature. Whenever there is doubt as to the specific rank of a natural population, the analysis of the morphological criteria will have to be supplemented by a study of ecological differences and of the completeness of reproductive isolation".

2051. 576.16:633.263
ROTHMALER, W. 633.52–2.51
Artentstehung in historischer Zeit, am Beispiel der Unkräuter des Kulturleins (*Linum usitatissimum*). [**The evolution of species within historical time, demonstrated by the weeds concomitant with cultivated flax (*L. usitatissimum*)**].
Züchter 1946 : **17/18** : 89–92.

Certain weeds occur wherever flax is grown, but only a few specially adapted species are able to thrive. Morphologically and physiologically these weeds are so like the flax plant with which they grow that they are difficult to distinguish from it, whereas they often differ considerably from their wild forms. The differences are largely conditioned by inheritance and they must be supposed to be due to a sequence of mutations from the wild forms, and also to selection. The wild form of cultivated flax and most of the wild forms of these concomitant weeds have been discovered. The characteristics of six wild forms of such weeds and of the corresponding cultivated forms are tabulated and discussed. *Lolium remotum* and *L. brasilianum*, though belonging to quite different sections of the genus *Lolium*, have a series of characteristics in common and are almost identical in appearance, the reason being that they have resulted from selection tending towards the flax type;

again in *Lolium* the seed has decreased in size as compared with the seed of the original forms, whereas in *Silene, Spergula* and *Camelina* the seed has increased in size, so that in all cases the size of seed will be as near that of flax as possible.

Mutations in which loss of pubescence occurs are frequent, the mutation rendering the plant more like the flax plant and such mesophilic plants are more likely to thrive in the damp atmosphere of the flax field than xerophilic species.

The weeds accompanying flax represent fairly young species and their genetic analysis should be valuable. Crosses are to be made between these weeds and their original forms to discover how far the process of evolution of species has progressed genetically.

Studies on germination showed that when *Galium Aparine* was mixed with flax seed, the capacity for germination of the flax was almost completely inhibited; whereas seeds of *Agrostemma Githago* improved the capacity for germination of wheat. These experiments are being continued. It may be that a proportion of weeds can have a destructive effect on cultivated plants, even during germination, or that some weeds may even be beneficial. Research on this problem is needed.

A list is given of the weeds accompanying flax in the various flax-growing regions of Europe and the Mediterranean region. E. W.

## *CYTOLOGY 576.3

2052. 576.3:539.16:35:007

**Douglas Lea Memorial Lecture.**

Nature, Lond. 1948 : **162** : p. 100.

A biennial lectureship is to be instituted under the auspices of the Hospital Physicists Association in memory of the late Dr. D. E. Lea. The subject treated will be the effect of radiation on living cells.

2053. Di Stefano, H. S. 576.312:581.192

**A cytochemical study of the Feulgen nucleal reaction.**

Proc. Nat. Acad. Sci. Wash. 1948 : **34** : 75–80.

Photometric determinations were made of the base, sugar and phosphoric acid of the desoxypentose nucleic acid of cartilage nuclei at various stages in the standard hydrolysis of the Feulgen reaction. The results indicate that at the time of optimum hydrolysis one half of the total base content has been removed; this presumably represents the purines. During post-optimal hydrolysis the whole nucleic acid molecules disappear from the nuclei. The possibility of using the Feulgen reaction for quantitative determination of desoxypentose nucleic acid is examined.

2054. Brachet, J. 576.312.2:581.192

**Biochemical and physiological interrelations between nucleus and cytoplasm during early development.**

Growth 1947 : **11** : 309–24.

Among the topics dealt with in this discussion of the interrelations between the nucleus and cytoplasm of cells are the possible role of chromatin as the main centre of protein synthesis, and the interrelation between ribonucleic and desoxyribonucleic acids.

2055. 576.312.2:581.192

**Nucleic acids and nucleoproteins.**

Cold Spring Harbor Symposia on Quantitative Biology 1947 : **12** : Pp. 279.

*Belozersky, A. N.* *On the nucleoproteins and polynucleotides of certain bacteria.* (*pp. 1–6*).

Comparative data on the nucleic acid and protein contents of bacteria, other micro-organisms, spores of *Fuligo varians* and embryos of cedar seeds, which are presented, illustrate the exceptional richness of the bacteria in these substances. The quantity of nucleic acid decreases with the age of the cultures. The polynucleotide content of bacteria is also high, and most of the proteins are bound up with the polynucleotides to form nucleoproteins. The results of chemical fractionation of nucleoproteins are discussed at some length. The bacterial polynucleotides are of two kinds, the yeast type and the thymonucleic acid type. The possible existence of isomerism in the polynucleotide group and of different degrees of polymerization of polynucleotides in the bacterial cell is of interest from the point of view of the phylogenetic correlation of nucleic acids.

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* General studies, see also individual crops.

*Boivin, A.* *Directed mutation in colon bacilli, by an inducing principle of desoxyribonucleic nature: its meaning for the general biochemistry of heredity. (pp. 7–17).*

After a brief review of previous work on the induction of directed mutations in pneumococcus by desoxyribonucleic acid, comparable experiments on two colon bacilli of different antigenic types designated $C_1$ and $C_2$ are reported. The smooth and rough forms of these bacilli are referred to as $S_1$, $S_2$ and $R_1$, $R_2$ respectively. $S_1$ and $S_2$ differ in chemical constitution and in the serological specificity of their polysaccharides. Spontaneous mutations from $S_1$ to $R_1$ and from $S_2$ to $R_2$ occurred frequently but the spontaneous reverse mutations were not observed.

When cultured on a filtrate of broth culture of $S_1$ or in broth with autolysate of $S_1$ added, $R_2$ often mutated to $S_1$, the active principle being in the nucleoprotein fraction which can be precipitated from the autolysate at pH 3·5 and is the desoxyribonucleic acid of $S_1$. The active principle will cause mutation in the colon bacillus without the addition of serum or ascitic fluids; this is not true of the pneumococcus mutations. Other kinds of nucleic acid which were experimented with could not bring about the change from $S_2$ and $S_1$.

The mutation of $R_1$ to $S_2$ could not be induced by using an extract of $S_2$ but it is thought probable that the mutation of a bacillus under the influence of desoxyribonucleic acid from another closely related bacillus is always potentially possible. There is great variation in the capacity of different colonies of colon bacilli to mutate; only one out of several different R mutants obtained from $S_2$ has exhibited the capacity to change from $C_2$ to $C_1$.

Presumably controlled mutation in bacteria must occasionally occur in nature but it is difficult to assess its importance.

The role of desoxyribonucleic acid and ribonucleic acid in bacteria and especially in colon bacilli is considered. The evidence for the presence of a true nucleus in bacteria and for the localization of ribonucleic acid in the cytoplasm and desoxyribonucleic acid in the nucleus as in higher organisms is reviewed. It is clear that the desoxyribonucleic acid of the colon bacillus is confined within a nucleus corresponding to that of higher organisms and it can be liberated during autolysis without much alteration. As in the higher organisms, genes are present in bacteria and there is evidence that recombination of these genes occurs by means of sexual fusion. The high content of ribonucleic acid in bacterial cytoplasm is in keeping with their rapid reproduction. Directed mutation is attributed to the solution of the bacterial chromosome apparatus without total destruction of its functional value, and the specificity of genes is considered to be determined by their desoxyribonucleic acid and not their protein components. In directed mutations of bacteria, a desoxyribonucleic acid apparently acts alone as a carrier of a hereditary character. Thus the existence of many different desoxyribonucleic acids is postulated.

It is suggested too that ribonucleic acids also differ among themselves and may transmit acquired characters in microorganisms and determine cellular type in metazoa.

It is pointed out by Weil in the discussion following the paper that the specificity range of the factors inducing controlled mutation in bacteria is not yet known, nor is the exact meaning of the terms genus and species as applied to these organisms clear. The small percentage of transformations of antigenic type in the Flexner bacillus, enzyme action in autolysates of colon bacilli, the cogency of the evidence for specificity of nucleic acids and the variability of different R mutants are discussed.

In an additional communication the demonstration of nuclei in various bacteria by Boivin, Vendrely and Tulasne is reported.

*Brachet, J.* *The metabolism of nucleic acids during embryonic development. (pp. 18–27).*

Work on the synthesis and functions of nucleic acids in animal embryos is summarized and discussed, special attention being devoted to the mechanism of induction of the neural tube.

*Chargaff, E.* *On the nucleoproteins and nucleic acids of micro-organisms. (pp. 28–34).*

Work published during the last 12 years on bacterial nucleoproteins and nucleic acids is reviewed and some hitherto unpublished work on the nucleoproteins of tubercle bacilli is reported.

The author and E. Vischer are investigating methods of separating and identifying minute amounts of nucleic acid constituents which may throw some light on the question of the specificity of nucleic acids.

*Cohen, S. S.* *The synthesis of bacterial viruses in infected cells. (pp. 35–49).*

The usefulness of viruses in the study of nucleic acid metabolism is pointed out.

With two exceptions, the viruses so far studied contain only one kind of nucleic acid. Reasons are given for considering the evidence for the presence of ribonucleic acid as well as desoxyribonucleic acid in the T2 bacteriophage inadequate. It appears also that enzymes are absent in viruses.

In order to test the hypothesis that a virus uses the enzymatic equipment of its host for the synthesis of new virus substance, a study was made of the metabolism of *Escherichia coli* B infected with T2 or T4 bacteriophage. (The viruses contained a hereditary factor, $r^+$, which inhibits lysis of the host bacteria and which can mutate spontaneously to $r$ which is not lysis-inhibitory. Attempts to induce mutations in T2$r$, T4$r$ and T4$r^+$ within *E. coli* by using the desoxyribonucleic acid of T2$r^+$ were unsuccessful).

The experiments showed that viruses cause profound changes in the synthetic powers of the host, making it impossible for the bacterium to multiply. It would seem that whereas normal bacteria synthesize almost three times as much ribonucleic acid as desoxyribonucleic acid, infected bacteria synthesize only desoxyribonucleic acid, which is the type found in viruses. Various other changes occur in the metabolism of the infected bacteria while the energy supply from respiration apparently remains constant. It would seem that the various virus constituents are synthesized from substances in the culture medium. Experiments with radioactive phosphorus indicate that ribonucleic acid is probably not a precursor of desoxyribonucleic acid. There is evidence which suggests that the period of eight to ten minutes after infection of a bacterium which intervenes before the commencement of desoxyribonucleic acid increase represents the time required for the synthesis of virus peptides which are necessary for the reception and organization of newly synthesized virus nucleotides.

The general conclusion drawn from these experiments is that the virus substance is synthesized by the host enzymes, largely from components derived from the external medium. Similar results have been obtained by other workers in studies of virus-infected silk worm cells.

In view of the above conclusion a virus is defined, provisionally, as "a parasite which organizes a specific enzymatic environment for its own multiplication". This generalization could be tested by studies of other virus systems, e.g. influenza virus systems. Another line of study of interest in this connexion would be an attempt to synthesize virus in an enzymatic environment without recourse to living cells.

*Davidson, J. N.* *Some factors influencing the nucleic acid content of cells and tissues. (pp. 50–59).*

The investigations of various workers including the present author on the desoxyribonucleic acid and ribonucleic acid contents and the ratio between them in different animal tissues are reviewed. The evidence is summarized for the location of the desoxyribonucleic acid in the nuclei and the ribonucleic acid in the cytoplasm. As regards the composition of the nucleolus, it appears that in rat liver ribonucleic acid is located, in general, in the central part of the nucleolus while desoxyribonucleic acid is probably present in the periphery. The effect of diet on the nucleic acid content of liver cells, the estimation of the amount of protoplasm in tissue samples by measuring the nucleoprotein phosphorus content and the nucleic acid content of bone marrow cells are discussed.

The discussion at the end of the paper includes contributions by R. E. Stowell and J. Brachet on the effects of nutritional changes on liver cells.

*Errera, M.* *In vitro and in situ action of ionizing radiations on nucleoproteins of the cell nucleus.* (*pp.* 60–63).

An account is given of experiments to determine the effects of irradiation, with hard X-rays, of nucleoprotein gels obtained by dispersing isolated nuclei from chicken erythrocytes in buffer solution. The results appear to indicate that alterations in the rigidity of the gel, a property shown to be closely correlated with the concentration of thymonucleic acid, are due to an indirect effect of the radiation and that the effect is modified by protecting agents. Such an indirect effect should be characterized by a temperature coefficient greater than 1; values actually obtained were 1·6 and 1·3.

In a further series of experiments, gels from the nuclei of irradiated erythrocytes and from nuclei which had been irradiated after isolation were found to be less rigid after longer irradiation. The temperature coefficient was approximately equal to 1. The results suggest a direct action of radiation on the nucleoprotein complex.

The doses of irradiation necessary for inactivation of the complex (as indicated by decrease in rigidity of the gel) are compared with the result of Lea *et al.* for inactivation of tobacco mosaic virus.

*Greenstein, J. P., Carter, C. E. and Chalkley, H. W.* *Enzymatic degradation of ribosenucleic and desoxyribosenucleic acids with an addendum on the effect of nucleates on the heat stability of proteins.* (*pp.* 64–94).

An account is presented of experiments to determine the action of enzyme extracts of various tissues of rats and mice on yeast ribonucleic acid and thymus desoxyribonucleic acid and on the components of these acids. References are made to comparable studies by various other authors. It was found that intact thymus nucleate increased the thermal stability of proteins by exerting a protecting action.

Other experiments throwing light on the action of ribonuclease are referred to in the discussion by Stowell and Kaufmann, and S. S. Cohen calls attention to a case in which protein coagulation by heat is not prevented in the presence of desoxyribonucleic acid.

*Gulland, J. M.* *The structures of nucleic acids.* (*pp.* 95–103).

The structure of polynucleotides is discussed under the following headings: the nature of all the individual nucleotides, the nature of the linkages between the nucleotides, the relative proportions of the individual nucleotides, and the relative positions of the nucleotides in the polynucleotides. The macromolecular structures of the ribonucleic acid of yeast and the desoxypentose nucleic acid of calf thymus are considered.

In the discussion following the paper the question of the possibility of the desoxypentose nucleic acid molecule having the form of a regular helix and this forming a molecule spiral which is reflected in the visible spiral coiling of the chromonemata is raised.

*Hydén, H.* *The nucleoproteins in virus reproduction.* (*pp.* 104–14).

The role of nucleic acids in the protein synthesis of normal cells is first described. An account is then given of investigations carried out by microspectrographical and other cytochemical methods on virus reproduction in various mammalian tissues. Pathological products identified in the cells contained nucleic acid and protein groups and it is suggested that these nucleoproteins can be regarded as the reproducing viruses themselves. Evidence was obtained that in some cases viruses reproduce themselves in the nuclei of the infected cells. Small viruses were found to be associated with the production of desoxyribonucleic acids and larger ones with ribonucleic acids. It appears also that the ribose nucleotides characterize viruses with the lowest degree of organization and desoxyribose nucleotides the more highly organized ones. On the basis of the data obtained viruses are defined as "self-reproducing units which act as parasites upon the nucleoprotein forming parts of the host cells".

*Knight, C. A.* *Nucleoproteins and virus activity.* (*pp.* 115–21).

A survey is presented of the results of investigations of the size, shape and chemical composition of viruses. Differences in the kind and quality of nucleic acids in viruses are

considered, and the evidence that the nucleic acid is linked with a protein to form a nucleoprotein compound is reviewed. It is pointed out that differences between the nucleic acids of viruses can be due to differences in the methods of preparation but there is, nevertheless, some evidence to suggest the specificity of nucleic acids.
The results of investigation of virus proteins are summarized. Some of them suggest that virus mutation involves fundamental changes in the composition of the virus protein. The induction in viruses of directed mutations and of mutations in general is discussed in the light of the data on virus chemistry.

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| *Mazia, D.,*<br>*Hayashi, T. and*<br>*Yudowitch, K.* | *Fiber structure in chromosomes.* (*pp. 122–30*). |

Experiments on the action of enzymes on salivary gland chromosomes of *Drosophila melanogaster* which throw some light on chromosome structure are described and the results discussed. It is concluded that the proteins of the chromosomes are in a fibrous state.
In a study of the structure of artificial fibres of various proteins it was found that the apparent fibrillar structure of the fibres resolves, under the electron microscope, into that of a folded sheet possibly just one molecule thick.
The digestion by pepsin of fibrous egg albumin protein was investigated, and a comparison of the results with the data on chromosome digestion demonstrates the compatibility of chromosome structure with the structure shown by the fibres.

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| *Michaelis, L.* | *The nature of the interaction of nucleic acids and nuclei with basic dyestuffs.* (*pp. 131–42*). |

The manner in which basic dyes are absorbed by solutions of nucleic acid and by the nuclei of cells is contrasted with their adsorption by negatively charged colloids other than nucleic acid, and an attempt is made to correlate the reaction of the nucleic acids with their structure. A further discussion by other speakers on staining of nuclei and nucleic acid follows the paper.

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| *Mirsky, A. E.* | *Chemical properties of isolated chromosomes.* (*pp. 143–46*). |

The technique of isolating and chemically analysing chromosomes and the results obtained by applying these methods to animal cells of various kinds are described. Four components were found in the isolated chromosomes, viz. desoxyribonucleic acid, ribonucleic acid, histone and a non-histone protein containing tryptophane, the relative proportions of which differed in different types of cells. Topics raised in the discussion include the possible chemical changes undergone by the chromosome during the mitotic cycle.

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| *Pollister, A. W. and*<br>*Ris, H.* | *Nucleoprotein determination in cytological preparations.* (*pp. 147–57*). |

Cytological methods of quantitative analysis of nuclei, chromosomes and nucleoli for nucleic acids, and proteins are described. The results of protein analysis of the nucleoli of pollen mother cells in *Zea Mays* at pachytene are included. They contain little if any protein bound in the same way as the histone of chromosomes.
Comments by other authors on the methods described are added.

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| *Ris, H.* | *The composition of chromosomes during mitosis and meiosis.* (*pp. 158–60*). |

The technique described by Pollister and Ris (see previous abstract) were used for analysing the nucleoproteins of onion root tip chromosomes at various stages of mitosis. Nucleic acid determinations showed that the total nucleic acid content of the nuclei increases during prophase, and in the metaphase chromosomes is about twice as much as in the interphase nucleus. Desoxyribonucleic acid also increases up to metaphase and then decreases. The ratio of nucleic acid to total protein and also the relative amounts of histone and non-histone protein remain constant during prophase. The relative proportions of ribonucleic and desoxyribonucleic acid are unchanged throughout mitosis as also is the ratio of protein to ribonucleic acid. These data indicate that the composition of the chromosomes does not change during mitosis but that the total mass of the chromosomes doubles during prophase.

The composition of the chromosomes during meiosis in grasshopper spermatocytes was also studied. During prophase I both the total nucleic acid and the desoxyribonucleic acid of the chromosomes increases as in onion root tip mitosis but they do not do so in prophase II. The ratio of nucleic acid to protein does not change appreciably during prophase. There must, therefore, be an increase in proteins corresponding to the nucleic acid increase. The relative amounts of histone and non-histone proteins remain constant during meiosis but in the second spermatid the non-histone fraction decreases and the histone fraction increases, as observed in the spermatogenesis of other organisms. The relative proportions of the two kinds of nucleic acid also remain constant during meiosis. In the second spermatid there is a decrease in ribonucleic acid which is to be expected, in view of the decrease in non-histone protein since these two substances are combined in the chromosomes. These data show that there is no change in the relative composition of the chromosomes until the formation of the second spermatids and that during prophase I the amount of chromosome substance increases about twofold but apparently remains constant in prophase II. It follows that the first spermatid contains a quarter of the chromosome substance present at metaphase in the primary spermatocyte.

Although it was the composition of the nuclei that was actually investigated this can safely be taken as an indication of the composition of the chromosomes, for even in the onion root tip cells where the nucleolus is especially large its volume is less than $\frac{1}{64}$ of the nuclear volume, and can thus be neglected. It appears likely that the increase in nucleoproteins during prophase is the result of chromosome reproduction.

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| *Schmidt, G.,*<br>*Cubiles, R. and*<br>*Thannhauser, S. J.* | *The action of prostate phosphatase on yeast nucleic acid.* (*pp. 161–68*). |

An investigation of the hydrolysis of ribonucleic acid by ribonuclease and acid phosphatase is reported. The discussion includes an account by J. S. Friedenwald of experiments on the digestion of nucleic acid by alkaline phosphatase.

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| *Schneider, W. C.* | *Nucleic acids in normal and neoplastic tissues.* (*pp. 169–78*). |

Methods of estimating nucleic acids in animal tissues are discussed. The results are presented of a study of the nucleic acid contents of a number of normal and cancerous tissues of rats and mice. The tumours analysed had similar nucleic acid contents but the various kinds of normal tissue varied greatly in this respect. In order to study the intra-cellular distribution of nucleic acids, rat liver, rat liver tumour and rat kidney cells were disrupted and separated into a nuclear fraction, a large granule fraction and an unfractionated residue, and the nucleic acid contents and enzyme activities of the different fractions were determined. The nuclear fraction contained all the desoxypentose nucleic acid. Pentose nucleic acid was present in all three fractions but mainly in the unfractionated residue. The relations between nucleic acids and enzymes are discussed. The mitochondria of rat liver were isolated and studied.

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| *Schultz, J.* | *The nature of heterochromatin.* (*pp. 179–91*). |

An account is given of the development of ideas concerning heterochromatin, and the structure of the heterochromatic regions and the functional nature of heterochromatin in *Drosophila* chromosomes are discussed. In the giant chromosomes of the salivary glands the heterochromatic regions show structural similarities to regions in which gene duplication has occurred, but the hypothesis that they do in fact represent such regions receives no support from cytochemical observations or from a consideration of mutant genes in the heterochromatic regions. Genetical effects of heterochromatin which are discussed are found to be associated with chromosome behaviour. There is some evidence to support the view that the heterochromatic Y chromosomes are associated with substances important in chromosome metabolism. The nature of these substances is discussed with reference to the relation of heterochromatin to nucleoli and to cytoplasmic and chromosome synthesis.

The sensitivity of heterochromatic regions to X-ray breakage is referred to by Kaufmann in the discussion.

*Serra, J. A.* — *Composition of chromonemata and matrix and the role of nucleoproteins in mitosis and meiosis.* (*pp. 192–210*).

After a short discussion of the morphological aspects of nuclear division, an account is given of the chemical composition of chromosomes as revealed by histochemical methods.
The chromomeres visible in meiotic chromosomes and the formation of bands in salivary chromosomes are attributed to differential deposition of thymonucleic acid and basic proteins on certain points of the chromonemata at which the spiralization becomes tighter. The nature of the gene is referred to in this connexion. The chromosomes are thought of as being made up of chromonemata on which are deposited compounds referred to as peripheric nucleoproteins.
The role of nucleoproteins and other components of the nucleus in mitosis and meiosis is discussed. It is concluded that in both kinds of division nucleoproteins become deposited on the chromatic threads and are responsible for the division and contraction of the chromosomes and that in addition, meiotic pairing is chiefly brought about by a special balance between the cytoplasmic and nuclear nucleoproteins. The nature of heterochromatin is discussed.

*Spiegelman, S. and Kamen, M. D.* — *Some basic problems in the relation of nucleic acid turnover to protein synthesis* (*pp. 211–23*).

Some of the evidence in favour of the hypothesis that nucleic acids play an important part in controlling protein synthesis is examined. An account is given of experiments on yeast to compare phosphate activity in the nucleic acids with that in other phosphate compounds present in the cell and to evaluate the relative importance of nucleic acid in nitrogen assimilation and protein synthesis. It was found that correlations exist between protein synthesis and changes in nucleic acid but that almost equally good correlations can be established between protein formation and the metabolic activity of other phosphate fractions. The kind of experiments which are needed in order to shed further light on the problem are indicated.
Points raised in the discussion include the association of enzymes with ribonucleic acid, the discrepancy between the results reported in this paper and data obtained in experiments involving ultra-violet absorption, and the nucleic acid metabolism of bacteria.

*Stedman, E. and Stedman, E.* — *The chemical nature and functions of the components of cell nuclei.* (*pp. 224–36*).

An account is presented of the chemical composition of the cell nucleus and of the nature and distribution of the various components, as determined by the authors. The functions of these components are then considered with special reference to the chemical nature of the chromosomes. The staining of the chromosomes with Feulgen solution is attributed to the adsorption of the dye by the non-basic, tryptophane-containing protein of the chromosomes, and it is shown that the distribution of nucleic acid in the nucleus cannot be determined by means of the Feulgen reaction.

*Taylor, B., Greenstein, J. P. and Hollaender, A.* — *The action of X-rays on thymus nucleic acid.* (*pp. 237–46*).

An investigation of the effect of X-irradiation on thymus nucleic acid is reported. In the presence of egg albumin, added to the thymus nucleic acid solution, a protective action was exhibited. The effect of the X-rays on aqueous solutions of thymus nucleic acid was to break up the long fibrous particles into shorter fragments of various sizes. The chemical properties and enzymatic susceptibility were not affected by this change. The discussion includes some observations by Buschke on the inhibition of mitosis and the destruction of nuclei by ultra-violet irradiation of cells of rat's corneal epithelium.

*Thorell, B.* *The relation of nucleic acids to the formation and differentiation of cellular proteins.* (*pp.* 247–55).

Nucleic acid and protein metabolism during cell growth are discussed with reference to investigations carried out on various kinds of growing cells, especially mammalian ones and the relation of cell differentiation to cell growth is considered.

*Witkin, E. M.* *Mutations in* Escherichia coli *induced by chemical agents.* (*pp.* 256–69).

The preliminary results are reported of experiments to determine the mutagenic effects of sodium desoxychlorate, pyronin, acriflavine and methyl green. The material used was a radiation-resistant mutant of strain B of *Escherichia coli.* It is referred to as strain B/r and mutants of this strain resistant to phage T1 as B/r/1. The experiments showed that exposure to sodium desoxychlorate, pyronin and acriflavine at concentrations sufficiently toxic to kill about 99% of the treated cells results in an increased proportion of B/r/1 mutants among the survivors. As B/r/1 was no more resistant than B/r to the toxic action of each of the chemicals employed it was concluded that selection was not responsible for the results. Methyl green did not induce mutations to the phage-resistant strain. It is likely that two independent mutations were involved in the experiments but no attempt was made to discriminate between them. The number of mutations induced by sodium desoxychlorate was in direct proportion to the time of exposure to a 5% solution.
A discussion by various authors on the results obtained follows the paper.

2056. 576.312.31:581.192:635.62
HOCQUETTE, M. and 576.312.315:581.192:635.62
HOCQUETTE, —. 576.312.2:581.192:635.62
Bourgeonnement nucléolaire dans les noyaux quiescents de l'axe hypocotylé de *Cucurbita pepo.* **(Nucleolar budding in the resting nuclei of the hypocotyl of *C. pepo*).**
Bull. Soc. Bot. Fr. 1948 : **95** : 55–60.

The prochromosomes and nucleoli of cells of the root tip and the region behind the tip of *C. Pepo* are described. In the root hairs and phloem, active budding of the nucleoli occurs. The nuclei in the cells of the hypocotyl as well as in the root hairs and phloem cells contain numerous masses of chromatin which appear to have some connexion with the nutritional function of the cells. It was noticed that large prochromosomes could coexist with chromatic bodies of all sizes.
The conclusions of other authors as to the existence of connexions between chromocentres and the nucleolus in plant cells are reviewed, and it is stated that such connexions have been observed in *C. Pepo.* The differentiation of the nucleolus itself into inner and outer zones which react differently to haematoxylin, gentian violet and other stains is also discussed. Such differentiation occurs in the hypocotyl of *C. Pepo.* The physiological function of the nucleolus is considered. The accumulation in the nucleus of masses of chromatin much more numerous than the ordinary chromocentres is stated to indicate rapid protein synthesis and to correspond to a temporary localization of thymonucleic acid, a step in the transformation of the ribonucleic acid of the nucleolus. The phenomena which have been described are not observed in tissues undergoing active cell division.

2057. THERMAN-SUOMALAINEN, E. 576.312.34
**The structure of secondary constrictions.**
Hereditas, Lund 1948 : **34** : 513–14. (Abst.).

Chromosomal constrictions in *Polygonatum* preparations fixed and stained in various different ways appeared not as thin threads but as unstained gaps in the chromosomes or as broad, stained zones frequently of the same width as the rest of the chromosome. The fact that the SAT zone is stainable by the Feulgen technique shows that it has a thymonucleic acid charge. The latter varies from cell to cell. The SAT zones in *Polygonatum* would seem, from their staining reactions, general appearance and response to cold treatment, to have a spiral structure.
Cold treatment of the chromosomes of various *Polygonatum* species did not reveal any heterochromatic regions apart from the secondary constrictions, if they be regarded as such.

2058. Huskins, C. L. and
Steinitz, L. M. 576.312.34:576.352
**The nucleus in differentiation and development. I. Heterochromatic bodies in energic nuclei of *Rhoeo* roots.**
J. Hered. 1948 : **39** : 35–43.

Literature is discussed on the problem of the possible role of resting or energic nuclei in the development and differentiation of plant and animal tissues, and on the relationship between the number of heterochromatic bodies or "prochromosomes" in energic nuclei and the number of chromosomes to be observed during mitosis.

The cytological experiments carried out on roots of *R. discolor* ($n = 6$) revealed no simple 1 : 1 relationship between the number of heterochromatic bodies counted in energic nuclei and the number of chromosomes recorded at mitosis. It is thought that direct relationship does exist, but is obscured by various factors, viz. frequent fusion of the heterochromatic bodies; variation in their size; variation in staining capacity, and other reactions involved in the making of the preparations; and subjective factors. The number of heterochromatic bodies, however, gives some indication of the number of chromosomes observable during mitosis, and it was found that the number was significantly greater in the differentiated region of the fourth and fifth mm. from the tip than in the meristematic region of the first and second mm. This increase in number is attributed to endomitosis, and thus related to polyteny and polysomaty. The significance of polyteny and polyploidy in development and differentiation, suggested in particular by the results of cytological investigations on certain insect tissues, requires further study. In a previously published paper the hypothesis has been put forward that polyteny, and in turn polyploidy, is a reflection of continuing reproduction during the energic steps of fundamental sub-units or "lamellae", this reproduction of the gene being related to the action of the gene in development and differentiation.

2059. Huskins, L. C.,
Steinitz, L. M.,
Duncan, R. E. and
Leonard, R. 576.312.34:576.356.5:633.18
**Polyteny and polyploidy in differentiated plant tissues and their possible significance.**
Genetics 1948 : **33** : p. 111. (Abst.).

Observations on the heterochromatin in "resting" cells and on mitosis following minimal treatments with indole-3-acetic acid show that a large proportion of differentiated cells of *Rhoeo* and *Hordeum* are normally polytene or polyploid. Tetrads (haploid number) have been found at mitotic metaphase and up to four double strands per chromosome at prometaphase.

The singificance of the observations in interpreting gene action and structure in relation to differentiation, and other genetical problems is indicated.

Preliminary evidence has been obtained that polyteny occurs in the endosperm of maize, and the differentiation of the nuclei in orchid pollen is related to the extrusion of nucleic acids and argenine into the cytoplasm.

2060. Hussein, F. 576.312.35:581.5
**Chromosome number of *Cardamine pratensis*.**
Nature, Lond. 1948 : **161** : p. 1015.

The chromosome numbers of plants of *C. pratensis* are correlated with their ecology.

2061. Löve, Á. and
Löve, D. 576.312.35:582
**Chromosome numbers of northern plant species.**
Rep. Dep. Agric. Reykjavík 1948 : Ser. B : No. **3** : Pp. 131.

After an introductory discussion on cytology as an aid to botanical taxonomy, a list is presented of the chromosome numbers of the pteridophytes, gymnosperms and angiosperms of Denmark, Finland, the Faeroes, Iceland, Norway and Sweden. Besides the diploid $2n$ numbers, the basic $x$ chromosome numbers are given. Only the most recent references are included. Notes on nomenclature and other points are given and there are indexes of synonyms and of genera.

2062. STERN, H. 576.35:581.33:581.17

**Protoplasmic changes during nuclear division in pollen mother-cells and microspores of *Trillium erectum*.**

Plant Physiol. 1948 : **23** : 381–96.

The pollen mother cells and microspores of *Trillium* are of particular interest because the rate of their nuclear division is extremely slow, and the study of physiological properties of the cells at successive stages of meiosis and mitosis is thus facilitated. Experiments on the behaviour of pollen mother cells and microspores in sucrose media are described, attention being given to the role of sucrose in maintaining viability, the effects of sucrose in relation to nuclear division, and the permeability of the pollen mother cells and microspores in relation to the cycle of nuclear division.

2063. WOODWARD, T. M. (jun.) 576.353:581.036.5

**Difference in form and reaction to cold in root-tip and apical bud chromosomes of *Medeola*.**

Bull. Torrey Bot. Cl. 1948 : **75** : 250–55.

The effects of cold treatment on the chromosomes of *Trillium* and *Paris* have been investigated by Darlington and La Cour. The present study was undertaken in order to determine the reaction to cold of the chromosomes of *Medeola*, another member of the Parideae. It was found that untreated metaphase and anaphase chromosomes in root tips differed markedly from those of the apical bud cells. Although the average volume of chromatin was the same in each case, the root tip chromosomes were much longer and narrower at metaphase than the apical bud chromosomes. They differed also in that chromatid fusion at metaphase was complete in the apical bud chromosomes but not in those of the root tip cells. The marked difference in degree of condensation was apparent throughout the whole of mitosis.

The results of cold treatment at 1·6° C. were different in the two types of tissue. In the root tips but not in the apical buds there was marked contraction of the metaphase chromosomes, and diplochromosome groups, similar to those observed in other plants after cold treatment, were frequent. No constrictions were observed to have been induced by the cold treatment in the chromosomes of either kind of tissue. Nor were special understained segments observed, although the temperature in these experiments was lower than that found necessary to produce such segments in *Trillium* and *Paris*.

It is inferred from these observations that the difference in form which normally exists between the chromosomes of the root tips and apical buds of *Medeola* results from a difference in the physiological state of the two tissues and that this difference is related in some way to temperature.

2064. 576.353:635.25
576.312.341
576.312.315

VANDERLYN, L.

**Somatic mitosis in the root tip of *Allium Cepa*—a review and a reorientation.**

Bot. Rev. 1948 : **14** : 270–318.

A detailed review is presented of the data on mitosis in the onion root tip, some original observations being included. The relation between the coiling and uncoiling of the chromonemata and the movements of the chromosomes with respect to each other is traced. The behaviour of the nucleolus and its structure, chemical composition and function are also taken into account, and chromocentres, heterochromatin and structural polarity in the cell are discussed.

2065. 576.354.4
576.312.34

MCCULLUM, G. A.

**Meiosis in *Aloe striata*, with special reference to chromosome structure.**

Abstr. Diss. Stanford Univ. 1940–41 : **16** : 24–26. (Abst.).

An account is given of the behaviour and appearance of the chromosomes of *A. striata* during meiosis. Some mitotic divisions were also studied. The number of chromonemata detected at different stages in both kinds of nuclear division does not agree with results obtained by X-ray induced chromosome breakage in other plants. A possible explanation of the discrepancy is suggested.

2066. Allsopp, C. B. and
Catcheside, D. G. 576.356:537.531:581.036
**Chemical breakage of chromosomes.**
Nature, Lond. 1948 : **106** : 1011–12.

The validity of the criticisms of Darlington and Koller (cf. Abst. 688) of Lea's target theory of X-ray phenomena (cf. *Plant Breeding Abstracts*, Vol. XVII, p. 350) is denied. Evidence is summarized showing that the number of structural changes in chromosomes during X-irradiation is dependent upon the temperature of the material at the time of exposure, but not before and after exposure. The question of where the chemical changes start, which occur between ionization and its biological effect, is discussed, and it is concluded that in the absence of further evidence the target theory must be retained as the most satisfactory working hypothesis of the origin of the X-ray phenomena.

2067. Fabergé, A. C. 576.356:537.531:581.036
**Action of temperature during X-ray treatment of *Tradescantia* chromosomes.**
Genetics 1948 : **33** : p. 104. (Abst.)

Several workers on *Tradescantia* have found that the number of chromosome aberrations due to X-ray treatment is smaller if irradiation is conducted at higher temperature. It is possible that an effect on rejoining is involved, but attempts to demonstrate this directly by changing the temperature after treatment have not been successful. An experiment by the author is reported in which the duration of the X-ray treatment and the time of temperature change were reduced to a minimum, and were short relative to the time that a broken chromosome remains free. It was found that temperature is effective during treatment only, and not if applied before and after treatment. It was found that change of temperature in either direction immediately preceding treatment, considerably increases the number of aberrations. A temperature gradient may subsist in the material as a result of such a temperature change, which may produce thermal diffusion resulting in the movement of chromosome threads. The effect may thus be parallel to that observed when cells are centrifuged during irradiation.

2068. Randolph, L. F.,
Longley, A. E. and 576.356:537.531:633.15
Li, C. H. 576.356:539.16:633.15
**Cytogenetic effects in corn exposed to atomic bomb ionizing radiation at Bikini.**
Science 1948 : **108** : 13–15.

Maize was chosen for this investigation because of its tolerance of heavy doses of ionizing radiation, its suitability for cytological and genetic studies of radiation effects, and because its chromosome mechanism of heredity has been so well investigated. The samples of maize which were used included a commercial dent first-generation hybrid of two inbred lines (L289 x I205) and an inbred line of sweet corn.

The seed was thoroughly air dried and placed in moisture-proof packets enclosed in canvas rolls, distributed on 22 ships in the Bikini target area at distances up to 1,500 yards from the target ship. Control samples were kept outside the target area, and additional samples of the same kinds of maize were treated with various doses of X-rays for comparison.

The germinability of the seed was not affected either by the atomic bomb radiations or by the X-ray treatments, but growth of the plants from the bombed sample nearest the target (sample A) and from X-rayed samples treated with 10,000 and 15,000 r was noticeably retarded in the seedling stage. The leaves of the seedlings were mottled and streaked with chlorotic areas. Sectors of defective tissue occurred in the older plants, of which 5–10% were deficient in growth at maturity, these effects being accentuated by the heavier doses of X-rays. The control plants showed the uniform growth characteristic of inbred lines and hybrids.

The visible sectors in the older leaves of nearly mature plants which had been mottled in the seedling stage fell into three groups: chlorophyll deficiencies, morphological anomalies and dead tissue. The number of such sectors was greatest in samples which were near the target, and those subjected to 15,000 r of X-rays had more such sectors than samples exposed to smaller doses. Morphological abnormalities occurred with about the same frequency in the bombed and X-rayed plants but chlorophyll deficient and dead sectors were relatively much more frequent in the bombed samples. The cause of this difference is not known.

Chromosome abnormalities including reciprocal translocations, inversions and deletions were observed at first metaphase in microsporocytes of unselected 15,000 r and Bikini A plants. Five times as many reciprocal translocations as deletions and inversions were observed. Except that there was a higher frequency of aberrations in the X-rayed material at pachytene and diakinesis, the effects of the two kinds of radiations were very similar.

The various types of chromosomal alterations observed are known to cause partial sterility. It was thus possible to determine their frequency of transmission by merely inspecting the pollen in the progeny of the irradiated plants. Plants in which the aberrations occurred were therefore outcrossed to untreated or very lightly treated plants. In the $F_1$'s from 15,000 r treated and Bikini A plants 7·3% and 6·9% respectively of the progenies exhibited pollen abortion, usually to the extent of about 50%.

2069. ROZANOVA, M. A. [ROSANOVA, M. A.] 576.356:634.74

**(On a peculiar type of inheritance among species of the section *Caninae* of the genus *Rosa*).**

Uspehi Sovremennoĭ Biologii (Advances in Modern Biology) 1947 : **23** : 459–61.

Reference is made to work of Fagerlind, Gustafsson and Håkansson which shows that the rose species of the section Caninae are not apomictic but reproduce by the system described by Blackburn and Harrison.

2070. LEVAN, A. and 576.356.2:581.04
TJIO, J. H. 576.356:581.04

**Induction of chromosome fragmentation by phenols.**

Hereditas, Lund 1948 : **34** : 453–84.

The activity of different concentrations of 42 substances containing phenolic OH or $NH_2$ groups or both, in inducing chromosome fragmentation in roots of *Allium Cepa*, is reported on. Pyrogallol, hydroquinone, *p*-phenylenediamine, pyrocatechol, *p*-aminophenol, hydroxyhydroquinone and benzoquinone are the most active.

At high concentrations the substances tested immediately kill the cells; at lower concentrations c-mitosis occurs; and at still lower concentrations chromosome fragmentation is induced. The concentration ranges at which each of these effects is brought about are reported for each separate substance. Evidence was obtained that certain substances induce c-mitosis by a specific chemical action.

Some of the fragments observed were attached to the rest of the chromosome by a fine thread; others were completely free. Translocations were very rare.

2071. SMITH-WHITE, S. 576.356.5:576.356

**Polarised segregation in the pollen mother cells of a stable triploid.**

Heredity 1948 : **2** : 119–29.

The results of a cytological study of *Leucopogon juniperinus* R. Br., a stable triploid forming four bivalents and four univalents at meiosis, are reported and discussed. All four univalents usually go to the same pole of the pollen mother cell.

2072. BELL, G. D. H. 576.356.5:581.04:575

**The artificial production of polyploids as a means of plant improvement.**

Brit. Sci. News 1948 : **1** : No. 8 : 6–8.

The significance of colchicine-induced autopolyploids and allopolyploids in crop improvement is discussed, with particular reference to interspecific and intergeneric amphidiploids produced within the Triticineae.

A brief summary is given of investigations on the colchicine induction of autotetraploids and amphidiploids now in progress at the Plant Breeding Institute, Cambridge University. Autotetraploids of sugar beet and sainfoin have been obtained. The production of autotetraploids is being planned in diploid and tetraploid *Triticum* and *Aegilops* species. Amphidiploids have been secured from interspecific wheat hybrids, and a large number of interspecific and intergeneric hybrids of *Triticum* and *Aegilops* are to be treated with colchicine in 1948. Further investigations will include hybridization of *Triticum* with *Agropyron* and *Secale*.

2073. Huskins, C. L. and
Steinitz, L. M. 576.356.5:581.143.24
**The nucleus in differentiation and development. II. Induced mitoses in differentiated tissues of *Rhoeo* roots.**
J. Hered. 1948 : **39** : 67–77.

Observation of artificially induced mitoses in differentiated tissue of *Rhoeo* roots showed that many of the nuclei were polyploid. It would seem that the polysomaty is not caused by treatment with the indole-3-acetic acid which was used in the experiment, but that this merely stimulates cell division. Two haploid nuclei and one nucleus undergoing a reductional division were also observed. Similar observations by other authors are cited. They show that polysomaty is of widespread occurrence. It is concluded that polysomaty and polyteny are associated in some way with differentiation and development.

2074. Kostoff, D. 576.356.5:632.952
**Atypical growth, abnormal mitosis and polyploidy induced by ethyl-mercury-chloride.**
Phytopath. Z. 1941 : **13** : 91–96.

Germinating seeds of *Secale cereale*, *Triticum vulgare*, *T. durum*, *T. persicum*, *T. polonicum* and *T. aegilopoides* were treated with 0·5% and 0·1% of the fungicide Granosan, i.e. with 0·01% and 0·002% of ethyl mercury chloride, for three to six days. The treatments resulted in abnormal mitosis and chromosome doubling, as has been generally observed in the case of treatment with colchicine or acenaphthene. The treatment of seeds on *Linum usitatissimum* and *Crepis capillaris* with Granosan, however, resulted in suppressed growth of the seedlings, but had no observable effect upon mitosis. Two kinds of treatment were given to seeds of *Pisum sativum*: (1) seeds were soaked and germinated in 0·5% Granosan solution for three to six days; (2) seeds soaked and germinated for 36 hours in tap water were treated with 0·5% Granosan solution for the next 36 hours in Petri dishes, the seeds being half covered with the solution. In both these treatments, seedling development was suppressed, and mitotic irregularities were produced, leading to chromosome doubling. The effect upon seedling growth and mitosis was, however, less pronounced than in the case of wheat and rye.

In view of these results the necessity for co-operation between plant breeders, phytopathologists and others concerned in disease control is emphasized.

2075. Łaczyńska, T. 577.17:581.162:581.3
Wpływ hormonu pyłkowego na rozwój owoców i nasion *Lilium regale*.
**(The influence of the pollen hormone on the development of fruit and seeds in *L. regale*).**
Ann. Univ. Mariae Curie-Skłodowska Lublin-Polonia. 1947 : **2** : 131–50.

It was found that the fruit developed fully when the pollen hormone reached the inside of the ovary by means of the pollen tube; when the hormone was applied only to the damaged surface of the ovary, from which stigma and style had been removed, poor development, or none resulted, and it was proved that pollen does not germinate best in the secretion of the stigma of the plant which produced the pollen.

The amount of hormone probably increases as germination of the pollen progresses. Unripe pollen contains no hormone; on the other hand the hormone retains its properties in pollen 8 days old, or even older.

The hormone acts primarily on the development of the nucleus and integuments. In certain cases the formation of the endosperm may be caused by the stimulation by the pollen hormone alone.

Sometimes the ovary responds to the application of hormone to the surface only, but the resulting fruit develops no seeds and the embryo soon degenerates. Pollen treated with strong doses of X-rays and in which the generative nucleus has apparently degenerated, can stimulate the ovary to normal fruit development but the fruits contain many empty seeds. The conclusion is that in the normal development of the embryo after fertilization the pollen hormone probably acts by stimulating the nucleus to successive divisions, so that two or four cells may be produced. E. W.

## SEX 577.8

2076. GOWEN, J. W. 577.8:575.11

**Sex determination in *Drosophila melanogaster*.**

Genetics 1948 : **33** : p. 106. (Abst.)

The location of seven genes affecting the sex genotype of *D. melanogaster* and thus leading to modifications in the sex phenotype is reported. Most of the developmental sex determination is in the direction of the male type; each gene shows large phenotypical effects. Seven out of the nine genes affecting the sex phenotype so far located by the present author and other investigators are located on the third chromosome.

## MICROSCOPIC TECHNIQUE 578.6

2077. BRADLEY, M. V. 578.6

**A method for making aceto-carmine squashes permanent without removal of the cover-slip.**

Stain Tech. 1948 : **23** : 41–44.

A method is described which enables aceto-carmine squash preparations to be made permanent without removal of the cover slip. The method was developed in connexion with the technique described by the author for making preparations of embryo sacs (cf. Abst. 2085).

2078. ELVERS, I. 578.6

**Permanent acetic smears.**

Hereditas, Lund 1948 : **34** : 511–12. (Abst.)

Dibutyl phthalate (palatinol) and glyceryl triacetate (triacetin) were found to be useful mounting media for acetic smears of pollen mother cells. The preparations will keep for several weeks or months and most of them for years.

2079. MELANDER, Y. 578.6

**The use of dissolvable cover slips when making permanent squash preparations of chromosomes.**

Hereditas, Lund 1948 : **34** : 512–13. (Abst.)

A technique is described for fixing and mounting cells of which the chromosomes are to be examined. A celluloid cover slip is used and pressure exerted on it in order to spread out the chromosomes. It is then dissolved in acetone so that its removal does not injure the film of tissue.

2080. ÖSTERGREN, G. 578.6

**Chromatin stains of Feulgen type involving other dyes than fuchsin.**

Hereditas, Lund 1948 : **34** : 510–11. (Abst.)

Thionin, brilliant cresyl blue, neutral red, safranin, janus black and indoin blue, all of which contain at least one $NH_2$ group, were found to act in the same way as fuchsin when substituted for this substance in the Feulgen technique.

2081. BARER, R. 578.6:535.82

**Advances in microscopy: 1—The reflecting microscope.**

Brit. Sci. News 1948 : **1** : 12–13.

An account is given of the reflecting microscope designed by C. R. Burch and its possible uses in biological research.

2082. Gabor, D. 578.6:535.82
**A new microscopic principle.**
Nature, Lond. 1948 : **161** : 777–78.

A new microscopic principle is described by means of which micrographs are obtained by electron analysis followed by optical synthesis, and electron objectives are dispensed with. A complete record of amplitudes and phases is provided in one diagram. The principle is applicable to a very general class of objects.

The application of the principle to electron microscopy is discussed, and it is stated an "electron interference microscope" is to be worked on.

2083. Richards, O. W. 578.6:535.82:632.3
**Phase microscopy in bacteriology.**
Stain Tech. 1948 : **23** : 55–64.

The use of the phase microscope in studying bacteria is described.

2084. Williams, R. C. 578.6:576.31:535.82
**The electron microscope in biology.**
Growth 1947 : **11** : 205–22.

A brief discussion of the use of the electron microscope for cytological work is included.

2085. Bradley, M. V. 578.6:581.3
**An aceto-carmine squash technic for mature embryo sacs.**
Stain Tech. 1948 : **23** : 29–40.

A method is described by means of which whole embryo sacs of *Nicotiana*, *Petunia* and probably other genera can be obtained in aceto-carmine ovule squash preparations. Development from the archespore stage up to the second or third division of the endosperm nuclei can be studied by the technique. Details are given of the chief stages in the method: (1) fixation; (2) heat treatment, which apparently increases the cohesion of the cytoplasmic and nuclear constituents; (3) maceration to separate the embryo sac from the surrounding cells; and (4) staining.

2086. Kurnick, N. B. and
Ris, H. 578.65
**A new stain mixture: aceto-orcein-fast-green.**
Stain Tech. 1948 : **23** : 17–18.

The use of a mixture of aceto-orcein, fast green and salt for staining plant and animal tissues is described. The mixture stains chromatin brownish-red and the nucleoli and cytoplasm green.

2087. Popham, R. A. 578.65
**Mordanting plant tissues.**
Stain Tech. 1948 : **23** : 49–54.

Methods of mordanting plant tissues for natural, synthetic and basic synthetic dyes are reviewed.

## *BOTANY 58

2088. 581.143.32:575.11:633
White, O. E. 581.143.32:575.24:633
**Fasciation.**
Bot. Rev. 1948 : **14** : 319–58.

The inheritance of fasciation is discussed. Many plant species include true-breeding homozygous races of fasciated plants. So far as is known they all arose as mutations, in most cases appearing first in experimental cultures as recessive segregates, differing from the normal form in one or more genes. Special reference is made to *Pisum sativum* var. *umbellatum* (the Mummy pea), *Nicotiana Tabacum* var. *fasciata* (the Dewey Sport), the various races of maize in which fasciation occurs and the tomato.

Fasciation arises in some cases from environmental causes and is not inherited. It has been induced artificially by various methods in many different species. In some cases it appears to be caused by inoculation with certain bacteria.

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* General studies, see also individual crops.

2089. WAARD, J. DE and
RODENBURG, J. W. M. 581.145.1:581.04
**Premature flower-bud initiation in tomato-seedlings caused by 2, 3, 5-triiodobenzoic acid.**
Proc. Koninklijke Ned. Akad. Wetenschappen, Amsterdam 1948 : **51** : 248–51.

Shortening of the period of vegetative growth which plants must undergo before flowering would be an advantage in genetical and plant breeding work. An experiment is described in which the formation of flower stems with flower primordia was induced in young tomato plants possessing only two or three small leaves by spraying the seedlings with tri-iodobenzoic acid.

2090. CHRISTOFF, M. and 581.163:576.354.4:581.32
CHRISTOFF, M. A. 581.163:576.356.5:581.04
**Meiosis in the somatic tissue responsible for the reduction of chromosome number in the progeny of *Hieracium Hoppeanum* Schult.**
Genetics 1948 : **33** : 36–42.

A tetraploid plant was obtained by treating the seeds of the diploid species *H. Hoppeanum* ($2n = 45$) with colchicine solution. For several years progenies were raised from the original diploid and induced tetraploid forms; both these forms were perennial and could thus be propagated by runners. It was found that the progenies obtained by sowing the seed from the form with doubled chromosome number contained plants with reduced ($2n = 45$) and unreduced ($2n = 90$) chromosome number in different ratios. Cytological and embryological studies revealed that the plants with unreduced chromosome number were the result of the development of aposporous embryo sacs, which followed a course similar to the apospory of the original diploid form, while the plants with the reduced chromosome number arose as the result of meiosis in the integumental cells; it is suggested that this unusual reduction in the integumental cells is influenced by external factors of some description.

2091. THIMANN, K. V. and
BEHNKE, J. 581.165.72:577.17:016
**The use of auxins in the rooting of woody cuttings.**
Publ. Maria Moors Cabot Foundation Harvard Forest, Petersham, Mass., 1947 : No. 1 : Pp. 272.

The results of investigations in the use of auxins in rooting cuttings of numerous species of woody plants, including many economically important species, are usefully summarized in tabular form. A bibliography of 274 references is appended.

2092. WILLCOX, O. W. 581.192:631.557
**Why some crop plants yield more than others.**
Science 1948 : **108** : 38–39.

It is shown how the data of different authors for sugar cane, beet and maize conform to the inverse yield-nitrogen law which is to the effect that the yields of all agrotypes, without any clearly proved exceptions, are inversely proportional to the percentage of nitrogen contained in the dry weights of the whole of their above-ground substance. The author remarks that in view of the spreads of yield which are indicated by the range of nitrogen percentages found in crop plants, it appears somewhat singular that plant geneticists and breeders have for so long overlooked the precision of this law as a guide in extending productivity.

2093. BRINK, R. A. 581.3:581.162.5:576.356.5
**The Angiosperm seed as a genetic mosaic.**
Science 1948 : **107** : 458–59.

The death before maturity of seeds resulting from fertile matings between different species or between diploids and their respective autotetraploids is discussed with reference to the genetical differences between the various components of the seed and the apparent effects of these differences. It is concluded that genetical incompatibility between endosperm and maternal tissue is a more important factor in seed failure than such incompatibility between embryo and endosperm.

2094. Isely, D. 581.48:582:631.521.5

**Investigations in seed classification by family characteristics.**

Res. Bull. Ia Agric. Exp. Sta. 1947 : No. **351** : 317–80.

Attention is drawn to the importance of seed morphology and taxonomy in seed analysis. The external and internal characters of the seeds of the following families are described: Gramineae, Cyperaceae, Polygonaceae, Chenopodiaceae, Amaranthaceae, Caryophyllaceae, Cruciferae, Rosaceae, Leguminosae, Euphorbiaceae, Malvaceae, Umbelliferae, Convolvulaceae, Labiatae, Solanaceae, Plantaginaceae and Compositae. A synopsis of the chief diagnostic characters of the seeds of the 17 families described is included. Clear drawings illustrating the seed characters of the different families and a bibliography of 43 references are given.

2095. Wanscher, J. H. 582:001.4

**The interrelation of the different terms used in plant systematics.**

K. VetHøjsk. Aarsskr. 1948 : 1–28.

The terms used in plant systematics are discussed with reference to the Linnaean system, ecology, reproduction, genetics, bio-systematics, the evolutionary aspect and the breeders' viewpoint; and correspondences are drawn between the terms of the units employed in the different kinds of classification.

2096. 582:576.3:581.5
582:575.1
Lousley, J. E. 582:001.4

**Critical British groups of flowering plants.**

Nature, Lond. 1948 : **161** : 733–35.

An account is given of the conference on "The study of critical British groups" arranged by the Botanical Society of the British Isles. The use of cytology in taxonomic studies was illustrated by E. F. Warburg. W. B. Turril discussed experimental methods, including genetical researches as taxonomical aids. A lecture on "Ecology in relation to critical groups" was given by A. R. Clapham.

Discussions on the problems of particular groups included a contribution by W. C. R. Watson on the evolutionary trends in the genus *Rubus*. In discussing vegetative and cytological variation in *Viola Riviviana*, D. H. Valentine showed that there was some evidence that supernumerary chromosomes were associated with the production of adventitious shoots.

A. J. Wilmott, in a paper on "Intraspecific categories of variation", proposed two new terms, "biverbum" for a group of plants of specific nature, i.e. possessing correlated characters and distinct distribution, and "triverbum" to indicate lesser units which have been referred to as microspecies, subspecies or races. Other papers read were "Chromosomes and classification in the genus *Rosa*" by K. B. Blackburn, "Forms of *Valeriana officinalis*" by T. A. Sprague in which he described cytological variants not distinguishable by morphological characters, "Some taxonomic problems in *Galium* and *Juncus*" by A. R. Clapham, and "Some problems of water buttercups" by R. W. Butcher.

## AGRICULTURE 63

2097. Howard, H. 63:35(41)

**The Commonwealth Agricultural Bureaux organisation.**

Farming, Lond. 1948 : **2** : 215–18.

An account is given of the history, organization and functions of the British Commonwealth Agricultural Bureaux.

2098. Telegdy-Kováts, L. 631.421

A korszerű szabadföldi kísérletezés elmélete. **(The principles of modern field experimentation technique).**

Rep. Hung. Agric. Exp. Sta. 1943 : **46** : 183–95.

The author reviews the field experimentation techniques based on the well-known works of Fisher, Goulden and Tippett. The methods of randomized blocks and Latin squares are described. T. P. B.

2099. Nuttonson, M. Y. 631.524:581.5(71)
**Ecological crop geography of the Ukraine and the Ukrainian agro-climatic analogues in North America.**
Amer. Inst. Crop. Ecol. Wash. 1947 : Study No. 1 : Pp. 24.

Nuttonson, M. Y.
**Agricultural climatology of Poland and its agro-climatic analogues in North America.**
Ibid. 1947 : Study No. 2 : Pp. 12.

Nuttonson, M. Y.
**Agricultural climatology of Czechoslovakia and its agro-climatic analogues in North America.**
Ibid. 1947 : Study No. 3 : Pp. 12.

Nuttonson, M. Y.
**Agricultural climatology of Yugoslavia and its agro-climatic analogues in North America.**
Ibid. 1947 : Study No. 4 : Pp. 11.

Nuttonson, M. Y.
**Ecological crop geography of Greece and its agro-climatic analogues in North America.**
Ibid. 1947 : Study No. 5 : Pp. 17.

Nuttonson, M. Y.
**Ecological plant geography of Albania. Its agricultural crops and some North American climatic analogues.**
Ibid. 1947 : Study No. 6 : Pp. 16.

Nuttonson, M. Y.
**Ecological crop geography of China and its agro-climatic analogues in North America.**
Ibid. 1947 : Study No. 7 : Pp. 28.

An account is given of the various agro-climatic conditions existing in different parts of the Ukraine, Poland, Czechoslovakia, Yugoslavia, Greece, Albania and China, and the North American counterparts of these regions are indicated with a view to eliminating some of the experimental work in connexion with plant introduction.

2100. Hopkins, E. F.,
Ramirez Silva, F. J.
Pagan, V. and
Villafañe, A. G. 631.531.16(72.95)
**Investigations on the storage and preservation of seed in Puerto Rico.**
Bull. P.R. Agric. Exp. Sta. 1947 : No. 72 : Pp. 47.

Experiments are reported on the storage and preservation of seed of field and vegetable crops.

## *DISEASES AND INJURIES, BACTERIA, FUNGI 632

2101. Richter, H. 632–1.521.6:578.08
Eine einfache und billige Zerstäuberspritze für Infektionsversuche.
**(A simple and cheap spraying apparatus for infection experiments).**
Züchter 1940 : **12** : 95–96.

The apparatus consists of (A) a pump for air pressure with a valve to prevent any possible suction of liquid into the air stream, (B) a 100–125 cc. bottle containing the infecting fluid and (C) a glass spraying apparatus. B and C are easily replaceable by a series of bottles and sprays, if spraying with a succession of liquids is necessary. E. W.

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* General studies, see also individual crops.

2102. OSTERWALDER, A. 632.111–1.521.6:634
Untersuchungen und Beobachtungen über die Entstehung von Frostschäden, insbesondere von Frühjahrsfrostschäden an Obstbäumen, Reben und einigen andern Pflanzen. (**Investigations and observations of the occurrence of damage by frost, especially spring frosts, to fruit trees, vines and some other plants**).
Landw. Jb. Schweiz 1947 : **61** : 443–85.

Experiments were made at the Institute at Wädenswil to test the effects of frost temperatures, mostly from — 2° C. to — 4° C., on fruit trees, vines and other plants. All plant organs are not equally frost resistant, and age and humidity or dryness are also important. The effect was studied of frost temperatures on the blossom of apple, pear and cherry, on vine buds and on twigs of walnut, oak, elm, ash and hazel, on *Spiraea*, *Forsythia*, *Kerria japonica*, *Pyrus ussuriensis* and *Rodgersia*; all were damaged at — 3° C. within a few hours, whereas beech shoots, rhubarb leaves, tomato plants and *Alliaria officinalis* were undamaged. Ripe fruits of different varieties of apple show even greater differences than the flowers in their reaction to frost, and even apples of the same variety show differences in resistance. A list is given of varieties of apple, classified as frost resistant, frost susceptible and intermediate. The experiments made are discussed in relation to the different theories on winter killing of plants. In the case of red apples, the greater frost resistance of the red half exposed to the sun as compared with the yellow-green half in shade has been explained as due to the more concentrated cell sap in the red portion. Red beets with red colouring matter are more resistant than those with yellow, and the frost resistance of beets having red colouring matter increases with the depth of colour. The red colour of vine leaves and fruit trees, showing premature autumn reddening is thought to be due to higher sugar and tannin contents. In all these cases the frost resistance is probably due not so much to the red colouring matter as to more highly concentrated cell sap. E. W.

2103. 632.2:576.35
632.2:576.312.6
632.3:576.35
BRAUN, A. C. 632.3:576.312.6
**Recent advances in the physiology of tumor formation in the crown-gall disease of plants.**
Growth 1947 : **11** : 325–37.

Investigations of tumour formation in the crown gall disease of plants are reviewed. It has been shown that normal cells are permanently changed to tumour cells under the influence of the bacteria and reproduce true to type in the absence of the bacterial infection. Abnormal nuclear phenomena observed in the tumour tissue included the presence of multinucleate cells, nuclear fragmentation and irregularly shaped nuclei. There was a strong suggestion of amitotic divisions. Mitotic figures were comparatively rare but quite normal except for occasional lagging chromosomes.

2104. MCELROY, W. D. and
FARGHALY, A. H. 632.3:535.61–31:575.1:575.243
**Biochemical mutants affecting the growth and light production in luminous bacteria.**
Arch. Biochem. 1948 : **17** : 379–90.

The growth and luminescence of five biochemical mutants of *Achromobacter fischeri* induced by ultraviolet light treatment have been subjected to detailed analysis. The group studied includes two mutants requiring arginine, one aspartic acid, one glutamic acid or proline, and one mutant requiring guanylic acid.

2105. STONE, W. S.,
HAAS, F.,
BENNET CLARK, J. and
WYSS, O. 632.3:535.61–31:575.243
**The rôle of mutation and of selection in the frequency of mutants among microörganisms grown on irradiated substrate.**
Proc. Nat. Acad. Sci. Wash. 1948 : **34** : 142–49.

The problem of differentiating between the selection of spontaneous mutants and the induction of additional mutants in investigations on bacterial mutations induced by ultra-violet light treatment of the substrate is succinctly discussed. The results of experiments on drug resistant and biochemical mutants of *Staphylococcus aureus* induced by ultra-violet light treatment are in agreement with the view that the increased number of mutants found in irradiated broth are the result of induced mutation and not of selection of spontaneous mutants.

2106. SIMMONDS, S. 632.3:537.531:577.1:575.243
**Utilization of sulfur-containing amino acids by mutant strains of *Escherichia coli.***
J. Biol. Chem. 1948 : **174** : 717–22.

Experiments are reported on the utilization of sulphur-containing amino-acids by a methionine-less mutant of *E. coli* (No. 58–161) and a cystine-less mutant (No. 58–309), both of which were induced by X-ray treatment (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 167).

Strain 58–161 was found to grow in the presence of *l*-methionine and *d*-methionine, *dl*-homocystine, *dl*-homocysteine, *l*-cystathionine and *d*-allocystationine. Strain 58–309 grew only in the presence of *l*-cystine, *l*-methionine, *dl*-homocystine and *dl*-homocysteine; while *l*-cystathionine was found to lessen the cystine requirement of this strain.

2107. SIMMONDS, S. and
FRUTON, J. S. 632.3:537.531:577.1:575.243
**The utilization of proline derivatives by mutant strains of *Escherichia coli.***
J. Biol. Chem. 1948 : **174** : 705–15.

Experiments are reported on the utilization of peptides by two proline requiring mutant strains of *E. coli*, Nos 679–183 and 679–662 induced by X-ray treatment (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 167). Strain 679–183 grows only in the presence of proline; strain 679–662 can use glutamic acid in place of proline. Strain 679–183 was found to utilize peptides of proline much more effectively than proline. This is the first instance to be reported of a biochemical mutant of *E. coli* which grows better in the presence of peptides of an essential amino-acid than in the presence of the free amino-acid. Strain 679–662 grew more rapidly in the presence of proline than in the presence of glutamic acid, but it utilized the peptides of proline much less effectively than the peptides of glutamic acid, neither the peptides of proline nor those of glutamic acid were more active as growth factors than the parent amino-acids.

2108. 632.3:575.242
APPLEBY, J. C. 632.3:575.243:535.61–31
An asporogenous variant of ***Streptomyces griseus.***
J. Gen. Microbiol. 1948 : **2** : 80–82.

The occurrence of an asporogenous form of *S. griseus* is reported. It appears to represent a true mutation and can be obtained and propagated on various media. Its frequency was markedly increased by ultra-violet irradiation of the spores. The cultures isolated were very stable.

2109. HERSHEY, A. D. and 632.3:575.242:575.114
ROTMAN, R. 632.3:575.246
**Linkage among genes controlling inhibition of lysis—in a bacterial virus.**
Proc. Nat. Acad. Sci. Wash. 1948 : **34** : 89–96.

The virus T2H, like all its relatives, exists in the form of a lysis-inhibiting wild type ($r^+$) and a spontaneous mutant phenotype (*r*) which has lost the lysis-inhibiting character and effects rapid lysis (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1113). The present paper reports the occurrence of genetically different *r* mutants, which differ in (1) rate of spontaneous reversion to lysis-inhibiting types; (2) the kind of reversion they undergo, either to a lysis-inhibiting form genetically similar to the wild type, or to forms genetically unlike the wild type; and (3) the number of wild types they produce upon "intercrossing", i.e. in a mixed population of virus growing in the same community. It is suggested that the spontaneous reversions to lysis-inhibiting forms which do not resemble the wild type genetically arose by suppressor mutations, rather than by back-mutation at the respective *r* loci. Experiments have not, however, been carried out which might reveal suppressor mutations closely linked to an *r* locus. Two independent linkage groups of distinct *r* loci have been found as a result of the "intercrossing" experiments. The analysis of one of these groups by intercrosses involving single and multiple factors has failed to provide any conclusive evidence concerning the possibility of crossing-over between linear structures. The existence of some kind of linkage system conditioning segregation and reassortment of genetic factors among viral particles seems quite clear, but it remains to be discovered whether reciprocal, or even material, exchanges are involved.

2110. MAYR-HARTING, A. 632.3:575.242:615.37
**The serology of *Pseudomonas pyocyanea.***
J. Gen. Microbiol. 1948 : **2** : 31–39.

It was found among other things that agglutinability in *Ps. pyocyanea* is diminished or destroyed completely by ethanol treatment. This should be borne in mind when interpreting data on the differences between variants.

2111. MITRA, B. N. 632.3:575.243:581.04
**Variations in vibrio strains.**
Proc. Nat. Inst. Sci. India 1944 : **10** : 225–26.

Dissociation of the El Tor I and El Tor II *Vibrio* strains was brought about by placing them in artificial media, including 10% peptone water, 10% sodium chloride agar, 5% sodium chloride agar, 1 : 50,000 and 1 : 100,000 gentian violet agar, and 1 : 500 and 1 : 800 phenol agar. The best results were obtained with the 10% peptone water. Both strains mutated with respect to both colony type and chemical constitution.

Carrier strain 10405, belonging to chemical group III, gave rise to three dissociants differing from the parent strain in chemical constitution and colony type.

One of them, 10405 T, was obtained by repeatedly passing the original strain through mice; 10405 Agg was derived by repeated subcultures of 10405 in 0·5% glucose broth, and 10405 D by prolonged growth in peptone water.

The nature of the mechanism causing dissociation in the bacteria is discussed. It is suggested that either strains consist of a mixture of various components one of which outgrows the rest when the strain is subcultured or, alternatively, variation is due to a change in the fundamental nature of the organism.

2112. ROBINSON, E. M. 632.3:575.243:581.04
**The relationship of arginine to the dissociation of *Staphylococcus aureus.***
Abstr. Thes. Univ. Wash. 1941 : **5** : 6–7. (Abst.)
Bull. Univ. Wash. 1941 : No. 659.

The effects of different concentrations of arginine on the dissociation of strains SW, avirulent SY and virulent HSY of *S. aureus* are described. Arginine stimulates dissociation in all three strains when added in strong enough concentrations to plain broth media, but only in SW and SY when added to lithium chloride broth.

2113. DOUDOROFF, M. 632.3:575.41:575.3
**Experiments on the adaptation of *Escherichia coli* to sodium chloride.**
Abstr. Diss. Stanford Univ. 1939–40 : **15** : 5–7. (Abst.)
Stanford Univ. Bull. 7th Ser. No. 3.

The adaptation of *E. coli* to growth in saline solutions was studied. Young cultures showed greater adaptability, as indicated by the proportion capable of reproduction in the new environment than old ones. The limits of variation could be extended by placing the non-dividing cells in gradually increasing concentrations of sodium chloride or in one intermediate solution; the number of bacteria which became capable of reproduction in a previously unfavourable concentration increased up to a maximum with increasing period of exposure to intermediate concentrations. The adaptation appeared to be reversible. Selection as well as adaptation occurred when the salinity of the media was increased.

2114. 632.3:576.312:578.6
632.3:581.16
Robinow, C. 632.4:576.312:578.6
**On the staining of nuclei in bacteria and fungi.**
Trans. Brit. Mycol. Soc. 1947 : **31** : p. 354. (Abst.)

The affinity of bacterial cytoplasm for basic dyes can be eliminated by removing the ribonucleotides from the cells by extraction with normal hydrochloric acid at 57–60° C. for 5–10 minutes. After this treatment the nucleus can still be stained and stands out clearly from the cytoplasm. Giemsa's stain proved the most satisfactory of many basic dyes which were tried.

The same result has been obtained by digesting fixed bacteria with ribonuclease.

In bacterial spores, the spore membrane, not basophilic cytoplasm, obscures the nucleus. This can be made transparent by being placed 10–20 minutes in normal hydrochloric acid at room temperature. The nuclei are stated to be superficially attached to, not contained in, the much less refractile dormant cytoplasm. Changes in the arrangement of the nuclear structures precede spore formation, the process being an example of free cell formation in the cytoplasm of the spore-forming bacterium.

Extraction with warm hydrochloric acid has proved useful also in the case of yeast cells and has allowed the staining of the chromatinic bodies. Better results have been obtained with Schizosaccharomycetes than with *Saccharomyces cereviseae*. The method is useful also for whole-mount preparations of fungal mycelia.

2115. 632.3:576.312.32
Bisset, K. A. 632.3:576.35
**The cytology of smooth and rough variation in bacteria.**
J. Gen. Microbiol. 1948 : **2** : 83–88.

A description of the behaviour of the chromatin bodies is included. In both the rough and smooth forms of the bacterial species investigated, these bodies usually divide immediately before the bacillus. After division the rough type of bacillus consists of two cells while the smooth type is unicellular. In each case there are two chromosomes per cell. In any preparation of a rough culture, however, the majority of the bacteria appear to be four-celled. At this stage each chromosome divides into two so that, before the division of the bacillus, there are eight chromosomes in all. These observations on chromosome behaviour apply to both spore-forming and asporogenous genera.

2116. 632.3:581.04:631.521.6
632.3:535.61–31:631.521.6
Bryson, V. 632.3:581.04:575.243
**Reciprocal cross resistance of adapted *Escherichia coli* to nitrogen mustard and ultra-violet light.**
Genetics 1948 : **33** : p. 99. (Abst.)

The induction of mutation to phage resistance in a normal strain of *E. coli* by exposure to nitrogen mustard is rendered difficult by the extreme toxicity of the chemical. To overcome this difficulty the bacteria were exposed to increasingly higher concentrations of the chemical, resistant survivors being selected and re-exposed. An end-point mutation of the nitrogen mustard resistant strain B 12/M, produced as the result of an exposure of one hour at 37° C. to a $0{\cdot}1\%$ solution of nitrogen mustard buffered in M/10 $Na_2HPO_4$, gave rise to 370 mutants resistant to phage T1 per $10^8$ cells during an eightfold increase in cell number. Exposure of nitrogen mustard resistant cells to ultra-violet radiation at 2537 Å showed that such cells were indistinguishable from radiation-resistant bacteria obtained by direct exposure of normal cells to ultra-violet light. It was also found that all the stocks resistant to ultra-violet radiation were resistant to nitrogen mustard at the first exposure to the chemical. These results may be significant in the interpretation of a common mode of action of certain physical and chemical agents in inducing mutation.

2117. Doermann, A. H. 632.3–2.8:575.24:631.521.6
**Lysis inhibition with *Escherichia coli* bacteriophages.**
Genetics 1948 : **33** : 102–03. (Abst.)

In turbid cultures of strain B of *E. coli*, lysis is inhibited as a result of infection with the wild $r^+$ type of the phage strains, T2, T4 and T6. Lysates from infections with the $r$ mutants of the $r^+$ type do not contain any inhibitor, nor can bacteria infected by the $r$ type be affected by the inhibitor of $r^+$ lysates. Data have been obtained indicating that inhibition of lysis is due to a secondary infection by $r^+$ phage particles, which may occur as early as 2½ minutes after the primary phage has been added to the culture, and which may consist of as few as three phage particles per bacterium.

2118. Monod, J. 632.3–2.8–1.521.6:575.24
**Amino-acids in the physiology of bacteriophage.**
J. Gen. Microbiol. 1948 : **2** : vii-viii. (Abst.)

The amino-acid requirements of bacteriophages, and the nature of bacterial mutations involving the simultaneous loss of sensitivity to phages and loss of the capacity to synthesize certain substances, are briefly discussed.

2119. Newcombe, H. B. 632.3–2.8–1.521.6:575.24:578.08
**Spontaneous mutation in *Escherichia coli.***
Genetics 1948 : **33** : p. 118. (Abst.)

Widely different rates for the mutations of the strains B and B/r of *E. coli* to resistance to phage T1 have been obtained, differing according to the data upon which the calculations are based. It is suggested that the differences found may probably be interpreted on the grounds of a delay between genetic change and phenotypic expression, which is variable within the clones of the mutants.

2120. 632.4:575.1
Dickinson, S. 632.4:575.114
**Fungal genetics.**
Trans. Brit. Mycol. Soc. 1947 : **31** : p. 353. (Abst.)

It is pointed out that so far fungal genetics has been a study of haploid inheritance, and that the association and dissociation of nuclei in multinucleate types has been a fruitful subject for investigation. Study of the arrangement of the products of segregation in such fungi as the smuts is regarded as a promising line of research on polarity or biassed segregation.

2121. Pontecorvo, G. 632.4:575.114
**Genetical aspects of heterokaryosis.**
Trans. Brit. Mycol. Soc. 1947 : **31** : p. 355. (Abst.)

It is pointed out that the genetics of natural populations in fungi must take account of both sexual reproduction and the alternation of hyphal fusions with the segregation of whole nuclei, which provides an additional mechanism of genetical recombination. Special genetical problems presented by heterocaryons are discussed.

2122. 632.4:575.114:575.12
Mather, K. 632.4:575.14
**Genetical flexibility and the breeding system in fungi.**
Trans. Brit. Mycol. Soc. 1947 : **31** : p. 355. (Abst.)

Since it depends on the recombination of genes, genetical flexibility is greatest in regularly cross-breeding species. In fungi self-mating is prevented by the action of genes at both the haploid and the diploid level. Inbreeding mechanisms, which can be of advantage in increasing the frequency of a highly adapted type, appear to have been superimposed on relic cross-breeding mechanisms in fungi as in Angiosperms. Some heterocaryotic fungi have abandoned the sexual cycle, but, by virtue of their heterocaryosis, have a flexibility which would be impossible in highly differentiated organisms. In other heterocaryotic species the sexual cycle and its associated outbreeding devices may persist.

2123. Parker Rhodes, A. F. 632.4: 575.17:575.24
**Phenogenesis in fungi.**
Trans. Brit. Mycol. Soc. 1947 : **31** : 354–55. (Abst.)

The action of genes in producing the visible characters of fungi is considered. Synhyphic fields, i.e. gradients along hyphae, are distinguished from anthyphic ones, i.e. gradients across hyphae, and it is stated that fungi can tolerate a much higher mutation rate among those genes which are called into play by synhyphic fields than among those called into play by anthyphic ones and that characters governed by anthyphic fields are thus either environmentally variable or of considerable stability. There is evidence that single gene variants in nature nearly always involve synhyphal characters.

2124. 632.4:577.8:575.11
WHITEHOUSE, H. L. K. 632.4:577.8:576.12
**Evolutionary aspects of heterothallism and heterokaryosis.**
Trans. Brit. Mycol. Soc. 1947 : **31** : 355–56. (Abst.)

The genetic mechanisms determining heterothallism in fungi are considered. It is suggested that the apparent progressive loss, first of the sex organs as structures essential for sexual reproduction and then of the organs themselves, in the evolution of the fungi, may be accounted for by the selective advantages of heterocaryosis. In heterothallic species in which heterocaryosis is restricted to mycelia of one mating type, heterothallism determined by multiple allelomorphs would be disadvantageous as compared with the two-allelomorph type in that it would restrict the possibility of heterocaryosis. It is improbable, therefore, that multiple allelomorph heterothallism would acquire a selective advantage until unrestricted heterocaryosis had been evolved.

2125. 632.4:581.6
COCHRANE, V. W. 632.421.2–1.557:575.243
**Commercial production of acids by fungi.**
Econ. Bot. 1948 : **2** : 145–57.

An account is given of the commercial production of citric, gluconic, fumaric and gallic acids by using selected strains of fungi, and of the utilization of these acids. Brief mention is made of the promising results obtained at the University of Cincinati, in the production of superior mutant strains of *Aspergillus niger* by X-rays and other treatments, giving higher yields of citric acid. Information is also provided on the experimental production of itaconic, kojic, lactic and oxalic acids.

2126. SWANSON, C. P. and
GOODGAL, S. H. 632.421.2:581.04:575.243:535.61–31
**The effect of nitrogen mustard on the ultra-violet-induced mutation rate in *Aspergillus terreus*.**
Genetics 1948 : **33** : p. 127. (Abst.)

When conidiospores of *A. terreus* were treated for 30 minutes with a 1·0% aqueous solution of nitrogen mustard, a 1·5% mutation rate was secured; 0·1% concentration of nitrogen mustard was ineffective in increasing the natural mutation rate. When spores treated with a 0·1% concentration of nitrogen mustard were, however, subjected to ultra-violet light of wave length 2537 Å, the mutation rate was greatly increased, the peak of the mutation curve being reached with lower energy values than in the case of spores not treated with nitrogen mustard. It is therefore suggested that even though the 0·1% concentration of nitrogen mustard was unable to induce mutations, the chemical reached the nucleus and reacted with it in such a way as to increase genic mutability. The nature of this sensitivization is at present undetermined, but the result shows that the mutation rate is not necessarily dependent only upon the amount of radiant energy absorbed.

2127. 632.421.9:535.61–31:575.246
632.421.9:537.531:575.246
GILES, N. H. (jun.) 632.421.9:581.04:575.246
**Induced reversions of biochemical mutants in *Neurospora*.**
Genetics 1948 : **33** : 105–06. (Abst.)

Experiments have been carried out on the production of induced adaptations of biochemical mutants of *Neurospora* by chemical treatment and irradiation. The frequency of adaptation can be greatly increased by ultra-violet light in certain mutants, as in the inositol-less, methionine-less, choline-less and riboflavin-less mutants studied. In the case of other mutants, e.g. a pantothenic-less strain, no adaptations have been secured by any of the treatments so far attempted. Genetical and physiological tests, particularly with the inositol-less mutant N. 37401, indicate that the induced adaptations represent reverse mutations to the original wild type allele. Treatments with X-rays, radio-active phosphorus and nitrogen mustard have also resulted in induced reversions of the inositol-less mutant No. 37401. In experiments with ultra-violet light, the frequency of reverse mutation of this mutant has been found to be a function of the radiation dose.

Preliminary studies on the frequencies of induced reversions in six independently produced, allelic inositol-less mutants show that some of these strains differ markedly in their mutability. Such differences suggest that, although the loci involved in these inositol-less mutants are allelic, the induced genetic changes resulting in the inositol-less phenotype are probably not identical in all six mutants.

2128. 632.421.9:575.242:577.1
HUNGATE, F. P. 632.421.9:575.116.1
**The biochemical genetics of a mutant of *Neurospora crassa* requiring serine or glycine.**
Abstr. Diss. Stanford Univ. 1945–46 : **21** : 10–11. (Abst.)
Stanford Univ. Bull. 7th Ser. No. 141.

The discovery is reported of a mutant of *N. crassa* which is unable to synthesize serine and glycine, and which differs from the wild type by a single gene. This gene is linked with five of the seven other mutant genes which were tested, the linkage group being associated with a chromosome which is neither the sex chromosome not Lindegren's second chromosome. Tryptophane, methionine and phospherine as well as serine and glycine stimulated the growth of the mutant. Asparagine and glutamine inhibit the stimulation of growth by serine and glycine.

A study of the growth requirements of two mutant strains of *Acetobacter melanogenum* showed that serine is converted into glycine in this species.

2129. SRB, A. M. 632.421.9:575.242:581.19
**Ornithine-arginine metabolism in *Neurospora* and its genetic control.**
Abstr. Diss. Stanford Univ. 1945–46 : **21** : 16–17. (Abst.)
Stanford Univ. Bull. 7th Ser. No. 141.

A study is reported of 34 arginine-requiring *Neurospora* mutants. In one of them growth responses were produced either by arginine or by the raising of the pH of the minimal medium from 5·5 to 7·0. At least seven strains were shown to represent mutations of different genes and to transmit the character for arginine requirement as a simple Mendelian factor.

Four strains can use ornithine or citrulline, two can utilize either citrulline or arginine and one is specific for arginine. Of the other 27 strains, two are biochemically, and presumably genetically, distinct from those referred to above; they can grow on proline, ornithine, citrulline or arginine.

The biosynthesis of arginine by *Neurospora* is discussed; it appears to consist of a series of genetically controlled steps.

2130. LEWIS, R. W. 632.421.9:575.242:581.192
**Mutants of *Neurospora* requiring succinic acid or a biochemically related acid for growth.**
Amer. J. Bot. 1948 : **35** : 292–95.

The results of experiments to determine growth requirements of *Neurospora* mutants 35402, 37602, 39311 and 39404, which each result from a single mutation, and of certain other mutants are described and discussed. As the substances utilized are all associated with the Krebs cycle it is tentatively assumed that this cycle is part of the normal metabolism of *Neurospora*. The question of the stage at which normal synthesis is blocked in the mutants is discussed.

2131. PIERCE, J. G. 632.421.9:575.242:581.192
**Studies on growth factor requirements of various mutant strains of *Neurospora*.**
Abstr. Diss. Stanford Univ. 1943–44 : **19** : 59–60. (Abst.)
Stanford Univ. Bull. 7th Ser. No. 96.

The growth responses of four *Neurospora* mutants to different chemical substances were determined. Nos 1298, 11263 and 45203 require various pyrimidine derivatives of nucleic acids. No. 3254 had a growth rate of about 60% of that of the wild type in the presence of adenine, hypoxanthine, oxyadenine, adenosine and yeast adenylic acid. A higher growth rate was obtained by using a cozymase preparation; this suggests that the mutant utilizes adenine more efficiently in the form of cozymase.

2132. Doermann, A. H. 632.421.9:575.242:581.192:578.08
**Investigations on the lysine-requiring mutants of *Neurospora crassa*.**
Abstr. Diss. Stanford Univ. 1945–46 : **21** : 6–9. (Abst.)
Stanford Univ. Bull. 7th Ser. No. 141.

Experiments on lysine requiring mutants of *N. crassa* showed that at least four and possibly five strains carry different factors controlling lysine synthesis. From this fact it may be concluded that five different steps in the biosynthesis of lysine are interfered with by the five mutant genes in the strains examined. Another type of lysine-requiring mutant was found which differed from the others in that at 25° C. it could acquire the ability to synthesize lysine.

The growth responses of these mutant strains to various amino-acids are described, and a procedure for making lysine assays is outlined.

2133. Teas, H. J. 632.421.9:577.1:575.242
**The genetics of canavanine resistance in *Neurospora*.**
Genetics 1948 : **33** : 127–28. (Abst.)

A threonine-less mutant of *N. crassa* is reported, which is able to utilize the amino-acid canavanine as a growth substance in place of threonine. The capacity to utilize canavanine was found to segregate as a character dependent upon a single gene difference. The parent strains from which the mutant was obtained consisted of a canavanine sensitive strain and a canavanine resistant strain. It is stated that resistance to canavanine is due to the possession of an enzyme which splits canavanine, thereby destroying its inhibitory effect, and that sensitive strains lack this enzyme and are therefore inhibited.

2134. Keitt, G. W.,
Leben, C. and
Shay, J. R. 632.421.9:634.11:575.11
***Venturia inaequalis* (CKE.) Wint. IV. Further studies on the inheritance of pathogenicity.**
Amer. J. Bot. 1948 : **35** : 334–36.

The apple scab fungus, *V. inaequalis*, incites two kinds of pathogenic reactions in the hosts, the lesion reaction and the fleck reaction. In order to test the hypothesis that the pathogenicity of the fungus to different apple varieties is determined by multiple allelomorphs, a monoascosporic line which caused typical scab lesions on Haralson and Wealthy and flecks on Yellow Transparent and McIntosh leaves was crossed *in vitro* with each of two monoascosporic lines inciting the converse reactions in these varieties. From each of the 35 asci of the progenies, the eight ascospores were isolated in serial order and the resulting lines tested for pathogenicity to the leaves of the four varieties. Segregation for pathogenicity as indicated by the lesion and fleck reactions was according to a 1 : 1 ratio in each ascus tested. It was found also, by analysis of the results, that pathogenicity to Haralson and Wealthy was determined at one locus and to Yellow Transparent and McIntosh at another. There was no evidence of linkage between these loci.

2135. Subramaniam, M. K. and
Krishna Murthy, S. N. 632.422.3:535.61–31:575.246
**A reverse mutation in yeast induced by ultraviolet irradiation.**
Curr. Sci. 1948 : **17** : p. 92.

A mutation of the smooth type of colony usually formed by the BY 1 strain of brewery yeast to rough type was observed. It is thought that the rough type had greater selective value than the smooth under the summer temperature conditions at the time of appearance of the mutation. A reverse mutation of the rough mutant to the original smooth type was secured as the result of ultra violet irradiation. A spontaneous reversion of the rough to the smooth type was also observed. These results suggest that the nature of sculpturing of the colony is determined by the alleles at a particular locus.

2136. Winge, Ö. and
Roberts, C. 632.422.3:577.15:575.11
**Inheritance of enzymatic characters in yeasts, and the phenomenon of long-term adaptation.**
C.R. Lab. Carlsberg 1948 : **24** : Sér. Physiol. 263–315.

The authors criticize the method of yeast hybridization used by Lindegren in which two haploid cultures are mixed, and his sharply separated categories of "legitimate" diploids, i.e. diploids produced by conjugation between a + and a — spore and capable of forming four viable spores in the ascus, and "illegitimate" diploids, i.e. diploids arising through the conjugation of two cells from the same haploid colony and which usually produce two-spored asci and non-viable spores. The cytogene and other hypotheses put forward by Lindegren and his collaborators (cf. Abst. 1458) to explain the inheritance of enzymatic characters in yeast are also critically examined.

By crossing *Sacchoromyces cerevisiae*, which ferments both maltose and galactose, with *S. Chevalieri*, which is unable to ferment maltose and ferments galactose only very slowly, the authors obtained a hybrid which rapidly fermented both sugars. The result confirmed the general rule that the ability to produce a specific enzyme is a dominant character. The crossing technique used throughout the experiments consisted in pairing two isolated spores.

By back-crossing the progeny of this hybrid to *S. Chevalieri* and analysing the segregation of a number of back-cross hybrids, it was found that *S. cerevisiae* possesses three polymeric genes for maltose fermentation, designated $M_1$, $M_2$ and $M_3$. Genes $M_1$ and $M_2$ result in the rapid fermentation of maltose, $M_3$ in the slow fermentation of maltose. *S. Chevialieri* possesses the recessive allelomorphs. The genotype of *S. cerevisiae* is thus $M_1M_1$ $M_2M_2$ $M_3M_3$, that of *S. Chevalieri* $m_1m_1$ $m_2m_2$ $m_3m_3$.

The production of galactozymase by *S. cerevisiae* was found to depend upon the gene pair $GG$. *S. Chevalieri*, which ferments galactose only very slowly, carries the recessive gene pair $g_sg_s$. Yeasts with $M_1$, $M_2$ and $G$ ferment both maltose and galactose rapidly; yeasts with only $M_3$ as a dominant and $g_s$ are unable to ferment maltose and galactose, respectively, except after a long-term adaptation, i.e. after they have been maintained from one to several days on a substrate containing the respective sugar. This long-term adaptation has no relation to mutation. The slowly fermenting types, i.e. those carrying only $M_3$ as a dominant and $g$ , can be adapted, de-adapted and re-adapted at will to the fermentation of the respective sugar. When fully adapted these types ferment the sugar at the same rate as the rapidly fermenting yeasts. When genes determining both types of enzymatic activity are present, the genes for rapid fermentation, $M_1$, $M_2$ and $G$, mask the effect of the genes for slow fermentation, $M_3$ and $g_s$. The substrate upon which the single spore cultures have been maintained previous to an experiment must therefore be taken into consideration in making genetical analyses, since non-adapted yeast types carrying only the genes for slow fermentation, $M_3$ and $g_s$, do not exhibit their ability to ferment until they have become adapted during the experiment itself. Modifying genes affecting $M_3$ were found to exert some influence on the time required for adaptation to maltose fermentation, apparently by influencing the growth rate. The genes $M_1$, $M_2$, $M_3$ and $G$ were inherited independently of one another. Evidence of frequent crossing-over during meiosis was obtained.

The results are similar in some respects to those reported by Lindegren and his collaborators, but the authors do not accept the cytogene theory or contamination theory put forward by these investigators to explain the inheritance of the ability to ferment galactose and melibiose.

2137. Lindegren, C. C. and
Raut, C. 632.422.3:577.16:575.24:581.095
**A direct relation between vitamin concentration and the production of vitamin-synthesizing "mutants".**
Genetics 1948 : **33** : p. 114. (Abst.)

It has been found that the metallic constituents of different synthetic media in which yeast cells are cultured, the length of time in which the yeast cells are allowed to remain in a vitamin deficient medium, and the concentration of the vitamin if present, all affect the capacity of vitamin synthesis; it is therefore stressed that a more critical study of the environmental conditions than has hitherto been given in investigations on biochemical mutants is necessary (cf. Absts 119 and 126).

2138. 632.422.3:581.04:575.243
SKOVSTED, A. 632.422.3:581.04:576.356.5
**Induced camphor mutations in yeast.**
C.R. Lab. Carlsberg 1948 : **24** : Sér. Physiol. 249–62.

Experiments were carried out on the effect of camphor treatment upon a haploid strain of *Saccharomyces cerevisiae.* In a preliminary experiment, abnormally shaped cells were produced by placing normal cells in good growth on a cover glass with a small piece of camphor at the bottom of a "Winge operating chamber". After 24 hours treatment, abnormal cells were isolated and giant colonies cultured from them on gelatine, in comparison with normal cells derived from the same material. The giant colonies produced by the abnormal cells showed a higher mutability than those cultured from the normal cells, containing a greater number of smooth and rough sectors. One culture out of the 15 originating from abnormal cells produced an abnormal dwarf type of colony.

Further experiments were carried out, use being made of camphor solutions in alcohol. The camphor treated cultures exhibited a greater mutability than the control cultures treated with alcohol only, as shown in the greater number of smooth and rough sectors. In addition, the camphor treated cultures included some dwarf types of colony; chimaeras between normal and dwarf colonies were observed. The yeast cells which formed abnormal shapes as a result of camphor treatment usually assumed their ordinary shape when re-cultured under normal conditions. The mutants usually deviated only slightly from the normal type in cell shape; some of the dwarfs, however, tended to continue to form large or abnormal cells.

Giant colonies of brewer's yeast were also strongly modified as a result of treatment with camphor solutions in alcohol. Except when a mutation had occurred the effect was temporary, and disappeared when the abnormal type was re-cultured under normal conditions. A large number of dwarf mutants were secured, including one highly mutating type.

Experiments were carried out on the effects of ether and acetone on the haploid strain of *S. cerevisiae* and on *Nadsonia Richteri.* A reaction similar to the primary reaction to camphor, i.e. the formation of abnormal cells, was observed, but no increase in mutability was obtained as a result of ether treatment.

The experiments reported have not supplied any evidence in favour of Bauch's belief that yeast types with enlarged volume produced by camphor treatment are polyploids (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 105, and Vol. XIV, Abst. 149).

2139. SUBRAMANIAM, M. K. 632.422.3:581.04:576.356.5:576.312.341
**Studies on the cytology of yeasts. II. Induction of polyploidy and heterochromatin.**
Proc. Nat. Inst. Sci., India 1947 : **13** : 129–39.

A comparison is given of the effects of colchicine and other polyploidizing agents on yeasts and higher plants, and the possible role of heterochromatin in the synthesis of nucleic acids in cell division is discussed. The immediate cytological effects of acenaphthene on active cells of a brewers' yeast strain with only two chromosomes (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 517) were investigated; the various chromosome figures observed during mitosis in the treated cells are described. It was found that the chromosomes in the treated cells have a chromophilic cortex and a chromophobic interior. Cells of the control showed no differential staining. The possibility of a change from euchromatin to heterochromatin in induced polyploidy is discussed, and the suggestion is made that the chromophobic interior of the chromosomes in treated cells may correspond to the heterochromatin of higher plants and animals.

2140. ANDERSSON-KOTTÖ, I. 632.472.3:615.37:575.11
**Inheritance of antigenic differences in *Collybia velutipes*.**
Hereditas, Lund 1948 : **34** : 443–52.

An investigation is reported of the inheritance of antigenic differences in the fungus, *C.*

*velutipes*. At least eight genes appeared to be involved in determining antigenic components in the material used in the experiments.

2141. Brodie, H. J. 632.472.7:581.162:575.116.7
**Tetrapolarity and unilateral diploidization in the bird's nest fungus *Cyathus stercoreus*.**
Amer. J. Bot. 1948 : **35** : 312–20.

A study of the pairing behaviour of 20 *C. stercoreus* cultures from Louisiana showed that the fungus is heterothallic with four mating types, *AB*, *ab*, *Ab* and *aB*.

Of 60 monospore mycelia of Indiana cultures, 51 were paired in all possible combinations. These also fell into the same four groups. Five saltants which arose from four of the cultures were of the same mating type as the parent mycelia. As there were remarkably fewer *ab* and *aB* than *AB* and *Ab* mycelia it is suggested that the sex factors may possibly be linked with a gene for vigorous growth. Certain sporelings are slow in beginning growth and these may have been avoided so that a representative selection was not isolated. A similar irregularity of distribution of sex types was noticed by Fries in *C. striatus* and explained in much the same manner.

In most of the pairings of compatible haploids, diploidization was of the regular type. Sometimes only one of the haploids became diploidized, or one became diploidized much quicker than the other. The diploids differed from one another and from the haploids in colour, texture and growth rate. The inheritance of colour and morphology is to be studied and reported on later.

2142. Thung, T. H. 632.485:632.3–1.521.6:578.088:576.16
Antagonisme tusschen *Actinomyces* spec. en *Rhizoctonia*-rassen. **(Antagonism between *Actinomyces* spp. and strains of *Rhizoctonia*).**
Landbouw 1947 : **19** : 286–87.

Different strains of *Rhizoctonia* differ from one another only in the virulence of their attack on host plants. Thus the *Rhizoctonia* of tobacco and that of roselle (*Hibiscus Sabdariffa*) must be considered to be distinct physiological races although morphologically they are identical and known as *Rhizoctonia Solani*. Provisional observations indicate that they behave differently towards certain Actinomycetes. These reactions may be of value in distinguishing between these physiological races. C. B.

## ECONOMIC PLANTS 633

2143. St John, H. 633(79)
**Report on the flora of Pingelap Atoll, Caroline Islands, Micronesia, and observations on the vocabulary of the native inhabitants : Pacific plant studies.**
Pacific Sci. 1948 : **2** : 97–113.

This flora of the Pingelap and Caroline Islands refers to species and varieties of cultivated and wild plants which are used for food and many other purposes by the natives, e.g. *Saccharum officinarum*, *Pandanus* sp., *Cyrtosperma Chamissonis*, *Tacca leontopetaloides*, *Artocarpus incisus*, *Terminalia* spp., *Ficus* sp. and *Musa paradisiaca*. The vernacular names in the different islands are given.

2144. 633:581.162.3(47)
**Artificial pollination of agricultural crops.**
Soviet News 1948 : No. 1947 : p. 4.

The artificial pollination of agricultural crops was recently discussed at a meeting of the Technical Council of the U.S.S.R. Ministry of Agriculture. The total area on which collective and state farms have applied artificial pollination amounts to 7,500,000 acres; it is calculated that this has given the country an additional yield of some 800,000 tons of rye, buckwheat, sunflowers, maize and other crops. The note states that this new agricultural method not only increases the yield but also considerably improves grain quality. The individual grain is heavier; the oil content of sunflowers and hemp seed is increased. Experiments on artificial pollination are being extended. In the near future the technique is to be applied not only to field but also to fruit crops; particularly good results have been obtained in experiments with grapes.

2145. THIÉBAUT, J. 633:582(39.4)
Quatrième note sur quelques plantes de la flore libano-syrienne. (**Fourth note on some plants of the Lebanese-Syrian flora**).
Bull. Soc. Bot. Fr. 1948 : **95** : 17–21.

Descriptions are given of several new species including *Daucus aleppicus* Thiébaut, *Quercus microphylla* Thiébaut and *Allium bassitense* Thiébaut.

2146. 633–1.524(92)
*KOCH, L. 633–1.524(49.2)
Stelselmatige planteninvoer. (**Systematic importation of plants**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 9th Mtg 15 March, 1946, Wageningen No. 46/3 : 57–65. (Mimeographed).

In this lecture emphasis is laid on the desirability of regular and large importations of genetical material from abroad, in order to determine whether they are immediately valuable or whether they can be used for breeding new and better varieties.

Practically every crop cultivated in Holland and her overseas possessions has originated from introductions. The soya bean, the Indian rice variety Tilakkukery, and the green manure crop *Crotalaria anagyroides* used on tea plantations, groundnut and cassava are cited as examples of valuable introductions in the Dutch East Indies.

Attention is drawn to the dangers of introducing plants that may become troublesome weeds and of importing new diseases and new strains of disease with plant introductions. The lecturer gave an account of the plant quarantine practised in Batavia, and also suggestions concerning the subsequent treatment of imported material.

It is pointed out that a mixture offers more possibilities than a pure line, since it provides opportunity for selection. In the testing of introductions, a species may prove unsuitable for the purpose for which it was originally imported and suitable for another purpose: e.g. *Crotolaria anagyroides* was imported as a possible source of the fibre, for which it was found to be useless, but proved valuable as a green manure crop; *Hibiscus Sabdariffa* was introduced as a fruit species for jam making and was found unsuitable for this purpose, but its shoots, which reach a height of 12 feet in four months, provide a useful fibre for sacking.

In Holland, where some crops, in contrast to those in the Dutch East Indies, have been subjected already to considerable selection, the situation is somewhat different. But only a small and random part of the available genetic material has been used in building up existing varieties. It is suggested that in testing introductions the tendency to discard new material which gives unfavourable results when compared with the product of generations of selection is wrong. A lower standard should be applied to new importations which should be considered as units from which new varieties can be bred.

It is thought introduced crops may still enrich agriculture in Holland. Maize is now being grown on a commercial scale; the soya bean may also find a place. It may be also possible to import useful plants from the far north and warmer climates.

The need for more efficient plant collecting is stressed, and possible methods of achieving this are discussed.

2147. KLINKOWSKI, M. 633–2–1.521.6:007(43)
Geh. Rat Prof. Dr. Dr. h.c. Otto Appel zu seinem 80. Geburtstag am 19. Mai 1947. (**Geh. Rat Prof. Dr. Dr. h.c. Otto Appel on his 80th birthday on 19 May, 1947**).
Züchter 1946 : **17/18** : 65–67.

This article, written in honour of Professor Appel's 80th birthday, describes his life and achievements. Amongst his researches are mentioned his work in phytopathology, on breeding for resistance in plants and on the protection of cereals from fungus diseases. E.W.

2148. 633.00.14(41)
**Guide to Auchincruive.**
W. Scot. Agric. Coll. 1947 : Pp. 53.

A guide is presented to the trial and demonstration plots of cereals, grasses, legumes and

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*** An extended summary of this paper is on file at the Bureau.**

other crops grown at the Auchincruive Farm. Notes are included on the cereal varieties grown on the farm.

2149. 633.00.14(42)

**Key to varieties of field and vegetable crops under trial, observation and propagation 1948.**

Nat. Inst. Agric. Bot. 1948 : Pp. 53.

Part 1 of this publication gives a key to the varieties of field and vegetable crops under trial, observation and propagation at the headquarters of the National Institute of Agricultural Botany, Cambridge. Part 2 provides a summary of the varieties grown at substations and other centres. Part 3 is a guide to the Hill Farm, Swavesey, a newly acquired site where pure stocks and varieties required for inclusion in trials are under multiplication. Part 4 gives the origin and pedigrees of the cereal varieties under trial.

2150. HANSEN, H. H. H. 633.00.14(48.9)

Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other work of plant cultivation**).

Beretn. Planteavl. Lolland-Falster 1943 (1944) : 15–33.

Full details are given of the methods and results of the variety trials and manurial experiments during 1943 with various crops, e.g. wheat, rye, barley, oats, roots, clover and lucerne. (Cf. also Absts 191, 621, 812 and 871).

2151. RASMUSSEN, L. 633.00.14(48.9)

Beretning om Sorts- og Stammeforsøg. (**Report on variety and strain trials**).

Beretn. Planteavl. Sjaelland 1943 (1944) : 199–223.

Details are given of trials of varieties and strains of wheat, barley, oats, maize, peas, clover, sugar mangels, sugar beets and swedes sent in for testing by private firms and other concerns in Denmark (cf. Abst. 274). Nearly all the varieties tested are known to readers of *Plant Breeding Abstracts* from other sources.

2152. RASMUSSEN, L. 633.00.14(48.9)

Beretning om Sorts- og Stammeforsøg. (**Report on variety and strain trials**).

Beretn. Planteavl. Lolland-Falster 1943 (1944) : 199–223.

This report has already been reviewed from another source (cf. Abst. 2151).

## CEREALS 633.1

2153. PESOLA, V. A. 633.1:575(47.1)

**Rye and wheat breeding in Finland.**

Heredity 1948 : **2** : 141–43.

An account of some of the rye and wheat breeding work carried out at the two Finnish plant breeding stations is presented. Finnish varieties of rye have been crossed with foreign varieties in order to combine the winter hardiness of the former with the stiff straw and ear and grain qualities of the latter. Thus Toivo was produced by crossing a Belgian rye Campiner with Finnish native rye and Oiva by crossing the German variety Petkus with Finnish native rye, while Pekka came from the cross Steel (a Swedish variety) x Härmä (from Finland), and Onni from the Swedish variety Star x Finnish native rye. These hybrid varieties have winter hardiness as good or almost as good as that of the Finnish native varieties, while the straw and ear and grain properties are better than in these, but not yet as good as in the foreign varieties.

Winter hardiness, baking quality and resistance to diseases, especially stripe rust caused by *Puccinia glumarum* and brown rust caused by *P. triticina*, are among the qualities aimed at in winter wheat breeding. Both the pedigree method of breeding and hybridization have been used. From the native wheat populations, the new varieties Sukkula, Pohjola and Olympia have been produced. They are very winter-hardy, especially Pohjola and Olympia, but have weak straw and are susceptible to *P. glumarum*. The baking quality of Olympia is excellent, that of Pohjola good and that of Sukkula medium. Sampo was produced by crossing Thule II (Svalöf) with a Finnish local variety, and Varma and Panu by crossing Svea (Svalöf) with a Finnish local variety. These varieties have not the winter hardiness or baking quality of Olympia or Pohjola, but their straw is longer and their rust resistance better. The winter hardiness of some varieties is assessed as follows, 10 marks being taken to represent perfect winter hardiness: Olympia 9·0, Pohjola 8·5, Varma 8·0, Sampo 7·5, Gluten (Svalöf) 7·0, Thule II (Svalöf) 6·0 and Yeoman (England) 5·0.

The breeding of spring wheats has aimed at producing varieties earlier than Diamond, but as good as this variety or superior to it in yielding capacity, strength of straw, disease resistance and baking quality. The newest varieties, Tammi, Sopu, Hopea and Kimmo, all of which were produced by hybridization, fulfill these requirements except that their yield is slightly inferior to that of Diamond. The parents of Hopea and Sopu were the Canadian variety Marquis and the Finnish variety Ruskea, both of which are exceeded by the hybrids in yielding capacity and strength of straw. Hopea equals Marquis in rust resistance, while Sopu is intermediate between the two parents in this respect. Both Sopu and Hopea are intermediate between them in baking quality.

2154. 633.1:575(48.9)
633–1.531.12(48.9)

D.L.F.s generalforsamling 1946. (**D.L.F.'s general meeting 1946**).
Tidsskr. Frøavl. 1946 : **18** : 65–77.

At the meeting of the Danish Agricultural Association for the Supply of Seed [Danske Landboforeningers Frøforsyning] at Roskilde the chairman read a report on the work of the Organization during 1945/46, containing the following points of interest to plant breeders.

The strain of bird's foot trefoil, Roskilde St., bred by the above Association and the Co-operative Wholesale Society for Denmark's Supply Association in trials with Italian and French commercial seed proved superior in yield and the strain was awarded the designation I*.

Other strains under official test seem promising and the breeding of new varieties is also in progress.

As regards experimental research, K. J. Frandsen's successful thesis on *Sclerotinia Trifoliorum* Eriksson records promising results as to the possibility of breeding red clovers resistant to this fungus and also combining resistance with yield (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1594).

The work of approving of new strains of culinary peas was continued at Toftø experimental plots.

A special arrangement has been reached whereby several Danish agricultural organizations, including the Danish Agricultural Association for the Supply of Seed, are to combine in promoting a cereal breeding programme to provide the farmer with the best possible varieties, by breeding and multiplication.

The raising of sweet lupins is proceeding on the same scale as in 1945.

Work was continued on seed production and various methods of growing sweet lupins.

2155. VESTERGAARD, E. 633.1:575(48.9)

Abed Planteavlsstation. (**Abed Station for Plant Cultivation**).
Beretn. Planteavl. Lolland-Falster 1943 (1944) : 7–14.

**Wheat**

Variety trials were successful and the yields averaged 40·1 hkg. of grain per ha.

The little breeding material which survived the three severe winters included crosses between varieties such as Skandia and Aering on the one hand and Joncquois and Jubile on the other. These hybrids were resown in autumn 1943 without selection.

A few Joncquois lines were sown again in autumn 1943 for comparison *inter se* and with Skandia II.

Several particularly winter hardy Finnish wheats were obtained and are to be used for crossing with Danish or specially productive foreign varieties.

**Oats**

Trials with the same 10 varieties as last year were continued (cf. Abst. 804). The average yield was 33·4 hkg. per ha. Yields were low owing to eelworm injury but Abed 148, from

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* I in Danish plant breeding is a mark of distinction and does *not* mean first class.

Guldregn II [Golden Rain II] x Minor, was revealed as remarkably unaffected by the pest and ranked first with a relative yield of 106. Unfortunately it has a rather small yellow grain. No lodging occurred in these experiments.

In a control experiment with 30 lines and varieties obtained from the crosses Fold x Minor, Svalöf 1430 x Minor, Minor x Argus, Abed 77 x Minor, Ørn [Eagle] x Minor and Svalöf Fold from Sejr [Victory] x Ørn, the highest yielding lines have been selected.

A couple of new oat varieties from Borris seem likely to be competitors of Svalöf Ørn which hitherto has so frequently done best in official trials for 1939–42.

**Rye**

Svalöf Staal [Steel] rye, treated with colchicine in 1941, gave an aberrant plant in 1941 with shorter and stiffer straw than the parent type; its progeny, which has been under observation, was planted in autumn 1943 in yield trials with the wheat Svalöf Skandia II.

**Barley**

Variety trials were exceptionally successful: the average yield of grain was 42·0 hkg. per ha.

From experiments with 55 lines and varieties and Abed Maja as control, 15 new lines from various crosses have been selected; these are to be tested on a larger scale in 1944. Both Abed 36/42 and Abed 40/42, which are late, short and stiff strawed, are specially promising. New material is available and more is being produced by new crosses between suitable varieties comprising the best foreign and native varieties. Some quite new varieties from Holland and Germany have been intercrossed to obtain fresh breeding materials. (cf. Absts 192, 802, 803 and 804).

2156. 633.1:575.127.5:633.289(47)

**Hybrid research in the U.S.S.R.**

F.A.O. European Bull. 1948 : No. 5 : 387–88.

A note is given on recent investigations carried out on intergeneric cereal hybrids at the Scientific Research Institute, Moscow, under the leadership of N. Cicin.

2157. 633.1–2.111–1.521.6(48.5)

Höstsäden och vinterhärdighetsproblemet. **(Autumn cereals and the winter hardiness problem).**

Försök och Forskning 1947 : **4** : p. 123.

This note gives the main content of the article by H. Ekstrand reviewed in *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1506.

2158. Atkinson, R. E.,
Robertson, D. W. and
Durrell, L. W. 633.1–2.4–1.521.6:575(78.8)

**New pathogens complicate cereal breeding program.**

Colo. A and M News 1948 : **2** : No. **12** : p. 5.

It is reported that new pathogenic races of the common cereal diseases found in Colorado during the last season include a race of barley loose smut to which Trebi, a barley variety hitherto considered resistant, is susceptible. Trebi was used as the source of smut resistance in the breeding of the new varieties Lico I and Lico II. Experiments are reported which indicate that there may be a new race of smut present to which these hybrid varieties are susceptible and to which Trebi is more resistant. It is possible that segregation of Lico x Trebi hybrids will give rise to a smooth awned hybrid with all Trebi's resistance. Crosses are being made between Lico and other varieties more resistant than Trebi to loose smut.

The appearance in Colorado of races 44 and 126 of leaf rust has caused infection of varieties bred for resistance to race 9.

In the spring wheat areas Newthatch has been omitted from the list of recommended varieties because of the appearance of race 128.

A new disease of oats, just discovered, is a joint rot known as Victoria blight (*Helminthosporium Victoriae*) to which varieties with Victoria as parent are especially susceptible. Extensive crosses have been made with Victoria in order to obtain resistance to crown rust and to smut. It is stated, however, that there are good prospects of introducing resistance to *H. Victoriae* into desirable varieties in a relatively short time.

2159. Pedersen, A.,
Andersen, S. and
Hermansen, J. 633.1–2.954–1.521.6(48.9)
Hormonderivaternes Virkning paa Kulturplanterne. I. Sprøjtning af Byg og Havre med 2, 4-D og 4K-2M. **(Effect of hormone derivatives on cultivated plants. I. Spraying barley and oats with 2,4-D and 4K-2M).**
K. VetHøjsk. Aarsskr. 1948 : 101–47.

Field experiments were carried out during 1947 on the effect of spraying varieties of oats and barley at different stages of development with various quantities of 4K–2M (Agroxone) and 2,4D (Herbatox); the effects upon yield, grain quality, and plant structure and development were investigated.

No marked varietal differences in susceptibility to 4K–2M and 2,4–D were observed in either crop. The small doses generally used for weed eradication had no or little effect upon yield of barley, but possibly had a more adverse effect upon yield in oats; such doses had little or no effect upon grain quality. Abnormalities in plant structure increased with the doses, particularly after spraying at the tillering stage.

2160. Watson, H. C. H. 633.1.00.14(94)
**Cereal tests in the Northern districts.**
J. Dep. Agric. Vict. 1948 : **46** : 223–24, 225–30, 231–34.

Cereal experimental work conducted at Dookie Agricultural College and other Northern District centres in Victoria is described. It includes hay trials of wheat and oat varieties; grazing trials of oats and wheat varieties; tests of susceptibility to rust of wheat varieties; trials of barleys with regard to yield and malting quality; pea varietal tests; and trials of flax varieties for linseed production.

## WHEAT 633.11

2161. 633.11(42)
Earnshaw, F. 633.16(42)
**A description of the recommended varieties of wheat and barley.**
Nat. Inst. Agric. Bot. Cambridge. Pp. 79.

An account is given of the characters used in the diagnosis of the wheat and barley varieties described. In the case of wheat the characters of the straw, ear, glume, terminal spikelet, rachis, grain, and the reaction of the grain to phenol treatment are used. In the case of barley the diagnostic characters are the fertility of the spikelets, ear density and minor characters of the ear and grain. Varietal descriptions are presented of the following wheats: Vilmorin 27, Bersée, Jubilegem, Holdfast, Yeoman, Juliana, Meteor, Atle, Warden, Victor and Wilhelmina, Fylgia, Little Joss, Steadfast, Redman, Squarehead's Master 13/4, Squarehead II, April Bearded and Rampton Rivet. The barleys described are: Prefect, Spratt Archer, Earl, Golden Archer, Pioneer, Kenia, Maja, Plumage Archer 1943 and Camton.

The barley Earl was selected from Spratt Archer at the Cambridge University Plant Breeding Institute, and first distributed by the N.I.A.B. in 1947. It resembles Spratt Archer in all important characters, but ripens seven to ten days earlier. The only morphological difference observed is in the shape of the collar below the ear. In Earl, 75% of ears have a funnel-shaped collar, the remainder showing the narrow cup form typical of Spratt Archer, but the difference is not sufficiently clear cut to be of use in indentification.

2162. 633.11(94)
Thomas, I. 633.13(94)
**New cereal varieties in Western Australia.**
J. Dep. Agric. W. Aust. 1947 : **24** : p. 341.

Particulars are given of the new wheat Diadem (cf. Abst. 160), and the new oat Orient (cf. Abst. 160), which have recently been submitted for registration in Australia by the Victorian Department of Agriculture.

2163. Boeuf, F. 633.11:575(61.1)
Blés tendres et blés durs en Tunisie—Un peu d'histoire. (**Soft wheats and hard wheats in Tunisia—A bit of history**).
Ann. Serv. Bot. Agron. Tunis 1946 : **19** : 95–109.

The history of the development of varieties of *Triticum vulgare* and *T. durum* suitable for cultivation in Tunisia is reviewed. As well as breeding work within these species hybridization of *T. durum* with *T. pyramidale* Per., *T. persicum* Vav. and *T. turgidum* L. was undertaken but no varieties of commercial importance were obtained from interspecific crosses.

2164. Séguéla, J. M. 633.11:575(61.1)
Les étapes de l'amélioration du blé dur en Tunisie. (**The stages of the improvement of hard wheat in Tunisia**).
Ann. Serv. Bot. Agron. Tunis 1946 : **19** : 11–33.

After referring to the great diversity of Tunisian wheats and the classification of the hard wheats by F. Boeuf, the author gives an account of the selection of varieties, started in 1906, the introduction of foreign varieties during the last ten years, and the hybridization of hard wheats which was initiated in 1926. The characteristics of the varieties now in use in Tunisia are indicated.

2165. Valdeyron, G. 633.11:575(61.1)
Réflexions d'ensemble sur le problème du blé dur en Tunisie. (**General reflections on the problem of hard wheat in Tunisia**).
Ann. Serv. Bot. Agron. Tunis 1946 : **19** : 5–10.

The breeding of wheats adapted for cultivation in Tunisia and the part played by such breeding work in the development of wheat production in that country are discussed.

2166. Grillot, G. 633.11:575(64)
Les blés tendres au Maroc. Quelques nouvelles variétés. (**The soft wheats of Morocco. Some new varieties**).
C.R. Acad. Agric. Fr. 1948 : **44** : 323–28.

The soft wheat varieties of Morocco and their breeding are discussed. The paper is summed up by F. Boeuf.

2167. 633.11:575(73)
**Ninth Eastern Soft Wheat Improvement Conference held at Evansville, Vincennes, and LaFayette, Indiana, June 8–10, 1947** :
Pp. 9. (Mimeographed).

The programme of the Ninth Eastern Soft Wheat Improvement Conference, held in Indiana during June 1947, is outlined.

(*Breeding for disease and Hessian fly resistance*).
(*pp.* 2–4).

Notes are given on the soft wheat breeding work in progress at LaFayette, Indiana.

The following wheats have been used as sources of resistance to Hessian fly and a number of fungous diseases:—

Resistance to leaf rust: Wabash and related strains, Chinese C.I. 6223, Hope-Hussar selections, Frondoso and Supreza.

Resistance to stem rust: Hope-Hussar, Kenya RL 1373, Thatcher, Frondoso and Supreza.

Resistance to loose smut: Trumbull, Kawvale, Hope-Hussar, Fairfield and Thorne.

Resistance to bunt: Hussar-Hohenheimer C.I. 10068–1, Hope-Hussar and Hungarian C.I. 4830.

Resistance to mosaic: standard soft wheat varieties, such as Trumbull, Fultz, Wabash, Thorne, Poole and Goens.

Resistance to Hessian fly: the spring wheats W38 and C.I. 56206–8, and the *T. durum* wheat F.P.I. 94587.

*Bonnett, O. T.* (*Breeding for plant type in winter wheat*). (*p.* 4).

Breeding investigations in progress at the University of Illinois are briefly described. The number of heads per plant and number of fertile spikelets per head were studied in ten winter wheat varieties and the $F_2$ hybrids from crosses between them. The average figures for both these characters showed that crosses between parents each with low values produce progenies with low numbers, and crosses between parents each with high values produce progenies with high numbers. Other combinations did not give consistent results. The average number of fertile spikelets per head has been found to be positively correlated with the diameter of the first node below the ear. A correlation of $-\cdot5745 \pm \cdot211$ between number of ears per plant and the diameter of the first node beneath the ear was obtained for the parents, but in the case of the $F_2$ a correlation of $+\cdot203 \pm \cdot1598$ was obtained for the same characters. The reason for this low positive correlation coefficient in the $F_2$ progenies is at present unknown.

*Morris, V. H.* (*Present status of the quality characterization of soft wheats*). (*pp. 5–8*).

Tests of milling and baking quality in use at the Federal Soft Wheat Laboratory, Wooster, Ohio, are discussed.

In the estimation of milling characteristics, the pearling test is used to indicate texture. A granulation test is also carried out; a sample of 50 grm. is ground in a carefully standardized Hobart coffee mill and sub-samples of 20 grm. are sifted in a Ro-Tap for five minutes. Attention is drawn to the general lack of an adequate experimental test to determine the relative millability of new varieties for such factors as flour yield, bran clean-up, etc.

A physico-chemical test based upon water retention capacity, by means of which the leaf volume potentialities of samples can be accurately predicted, is used for estimating baking quality of experimental and commercial samples. The test requires only 5 grm. of flour. The determination of pastry making quality has received considerable attention. The test in use is based upon the ability of the pastry dough to spread during baking. Only 40 grm. of flour are required for the test. The viscosity test is not considered to be reliable. The mixogram area has some value in testing advanced selections as it predicts general strength, and thus pastry baking quality.

At present no specific test of biscuit baking quality is available. Viscosity and mixogram tests are carried out, and the data obtained compared with the results of similar tests on satisfactory commercial soft wheat varieties. A similar situation exists in the estimation of cake baking quality.

The value of the above tests in breeding work is emphasized, but it is pointed out that much progress has to be made before a series of tests is developed which will disclose all the properties of the soft wheat varieties in respect to their various uses.

*Bayles, B. B.* (*Discussion of regional nurseries and regional aspects of soft wheat improvement*). (*pp. 8–9*).

The following varieties are being grown indefinitely in the Uniform Eastern Soft Wheat Nurseries for research on quality: Kharkof, Minturki, Kawvale, Purkof, Clarkan, Harvest Queen-Kawvale, Trumbull, Thorn, Fairfield, Wabash, Blackhawk and American Banner.

In the work of improving the soft wheats of the United States, the need for fundamental research on disease resistance, grain quality and several other aspects, is emphasized.

2168. 633.11:575(73)

**Tenth Eastern Soft Wheat Improvement Conference held at Cincinnati, Ohio November 18–20, 1947** (1948) : Pp. 15. (Mimeographed).

*Bonnett, O. T.* (*Phases of developments of the wheat plant in relation to yield*). (*pp. 1–2*).

The plant characters affecting yield were discussed in relation to the different stages of plant development.

*Caldwell, R. M.* (*Sources of resistance to leaf and stem rust of wheat*). (*pp. 2–5*.)

The varieties Hope and Wabash and their derivatives have become increasingly susceptible in the field to leaf rust, on account of the attack of new physiological races. Among the soft winter wheats, Chinese C.I. 6223, certain types such as Purcam and Malakof, and the South American varieties Frondoso, Fronteira, Supreza and Frontana show a high degree of mature plant resistance in the field. From crosses of the three first named South American varieties with soft red winter wheats promising soft winter types with the leaf rust resistance of the South American wheats have been secured. But reliance upon only mature plant resistance would appear to be unsatisfactory. Sources of seedling resistance to leaf rust include the winter wheats Malakof, Wabash, Webster and Klein Aniversario, and the spring wheats, Warden-Hybrid English, La Previsión 25 and Timstein. The latter two are South American varieties.

Among the soft winter wheats, sources of resistance to stem rust include: lines derived from Hope; lines derived from Thatcher; lines derived from the South American wheats, Frondoso, Fronteira and Supreza; and lines derived from *T. Timopheevi*. Crosses between these parents and desirable soft wheats may be expected to provide progenies with commercial potentialities as regards adaptation, yield and quality. The spring wheats Timstein, Frontana and Kenya, and the hard red winter wheats derived from Marquillo should also prove valuable in breeding for leaf rust resistance in the soft wheats. The physiological race of leaf rust, 15B, however, presents a difficult problem. This race is known to attack all the above mentioned sources of leaf rust resistance. A number of Kenya wheats, McMurachy and Red Egyptian are resistant to this race, but it has been found that the Kenya and McMurachy wheats lose much of their resistance at high summer temperatures in the United States.

Promising resistance to the conditions of "brown necrosis" or "false black chaff" genetically associated with the stem rust resistance of Hope and H44 has been obtained in Indiana from crosses of Kenya R.L. 1573 with Hope derivatives.

*Bever, W. M.* (*Physiologic races of* Ustilago Tritici *in the Eastern Soft Wheat region of the United States*). (*p. 5*).

The data on which this discussion was based have been published elsewhere (cf. Abst. 1542),

*Morris, V. H.* (*The relation of protein content to quality characteristics of soft wheats*). (*pp. 6–12*).

The effect of the protein content within a variety upon baking quality has been investigated in samples of 12 wheat varieties grown at different locations, chiefly in Ohio. The varieties ranged in quality from the hard red winter wheats, Kharkof and Purkof, to the soft white wheat American Banner. Scattergrams are given showing the relationship between (1) flour protein and viscosity, (2) mixogram area and flour protein, (3) pastry diameter and flour protein, and (4) loaf volume and flour protein.

(*Round table discussion*). (*pp. 12–14*).

The following topics were considered: increasing loss due to mildew infection in North Carolina as a result of the appearance of a race to which Hardired and other varieties are susceptible, and breeding for resistance to this race; speckle and leaf blotch (*Septoria Tritici*); scab in Ohio; and the value of the Uniform Eastern Soft Wheat Nurseries.

In breeding work at the North Carolina Experiment Station, the varieties Michigan Amber C.I. 11770, Chul C.I. 2227, Converse C.I. 4141, Indian C.I. 4489, Huron C.I. 3315 and Trumbull$^2$ - Red Wonder - Steinweidel-Timopheevi P.I. 134505, Y2802, have shown resistance to mildew, including the race attacking Hardired.

At Manhattan, Kansas, the wheats Sibley No. 81, Gladden, Nabob, Prairie, Baldrock, Brill, Leap and Purdue have been among the more resistant varieties to leaf blotch.

At the Ohio Experiment Station, certain varieties have consistently shown less scab infection than others but these differences appear to be mainly due to lax heads and other characteristics less favourable to infection rather than to true resistance.

(*Taylor, J. W.*) (*p. 15*).

The following heterozygous $F_5$ or later hybrids are available at the Plant Industry Station. Beltsville, Md., for exchange:—

Resistant to Hessian fly and leaf and stem rust: Illinois IW38-Illinois I-Hope-Purplestraw$^3$-Trumbull; Illinois IW38-Illinois I-Hope-Purplestraw$^3$-Thatcher-Frondoso-Redhart 3-Noll 28-Leap; Illinois IW38-Illinois I-Hope-Purplestraw-Thatcher-Leap.

Resistant to loose smut, leaf and stem rust: Trumbull-Red Wonder- (Steinweidel-Timopheevi P.I. 134505)-Leap-Trumbull²-Frondoso.
Resistant to leaf and stem rust: Kanred-Frondoso-Purcam (bulk hybrid).

(*Bonnett, O. T.*) (*p. 15*).

The following breeding material available at the Agronomy Department, University of Illinois is listed: (Rex x 37-1153 OSU. 101-3 x Trumbull $F_1$) x 41-809; Brill x Gladden x Gladden $F_4$; Wabash x Illinois 2; (Rex x 37-1153 $F_1$) x 40-1205 (Fulcaster x Wabash $F_1$) x (Gladden x Illinois 2 $F_1$) $F_4$; (Rex 37-1153 $F_1$) x (Prairie x Mediterranean-Hope) $F_4$.

2169. 633.11:575(93.1)

**Hilgendorf wheat of outstanding baking quality.**
N.Z. J. Agric. 1948 : **76** : 117–19.

An account is given of the new wheat Hilgendorf (cf. Abst. 1513).

2170. 633.11:575(93.1)

**A new high-yielding wheat variety—WRI-Yielder.**
N.Z. J. Agric. 1948 : **76** : 221–22.

The new wheat WRI-Yielder has been developed at the Wheat Research Institute of the Department of Scientific and Industrial Research, New Zealand, from a cross between Tainui and Tuscan, and is recommended for cultivation in certain districts of the South Island. The variety is superior in yield and 1000 grain weight to Cross 7, and in baking quality is similar to the latter. It matures about a week earlier than Cross 7. Although WRI-Yielder is more resistant to lodging than Tuscan, Fife-Tuscan and Tainui, it is not as resistant as Cross 7. It is not therefore recommended for heavy land where lodging is to be expected. In addition to its normal use as an autumn wheat, the variety shows promise in spring sowings. As soon as sufficient seed stocks have been produced, WRI-Yielder will be put on the market.

2171. 633.11:575(94.6)
633.13:575.42(94.6)
TAYLOR, B. L. 635.656:575.42(94.6)

**Cressy Research Farm.**
Tasm. J. Agric. 1948 : **19** : 19–27.

Work at the Cressy Research Farm, Tasmania, includes the breeding, selection, multiplication and distribution of improved and pure lines of cereals and pulse crops.

The investigations on wheat are mainly concerned with trials of varieties introduced from New Zealand and Australia, and of unnamed hybrids developed in Tasmania. The latter consist of wheats producing flours of low strength suitable for the biscuit trade and other purposes, and wheats giving flours of higher strength. Tests on some of the varieties in the first group are now almost complete, and seed multiplication has been begun.

Multiplication of the malting varieties Golden Archer, Plumage Archer and Goldthorpe has been the chief work carried out on barley.

Single plant selections of blue and grey peas have been isolated, bulked and released. Apart from slight improvements in yield and quality, these strains are uniform in type and ripening.

2172. 633.11:575.11
633.11:576.35
633.11:575.127.5
SEARS, E. R. 633.11:576.356.5:575.127

**The cytology and genetics of the wheats and their relatives.**
Advances Genet. 1948 : **2** : 239–70.

The cytology and genetics of the wheats and their relatives are reviewed with reference to the following: genome homologies in *Triticum*, *Aegilops*, *Agropyron*, *Secale* and *Haynaldia*, amphiploids, reduced allopolyploids, and types with the entire chromosome complement of one species plus one or more pairs of chromosomes from a second species; autoploids; haploids; studies of chromosome morphology; cytogenetic studies; genetic studies with diploid, tetraploid and hexaploid wheats; and genetic studies with *Aegilops* and *Secale*. An extensive bibliography is appended.

2173. 633.11:575.11:581.4(43.8)
Kaniewski, K. 633.11:575.127.2:576.356.5
Studia genetyczne nad pszenicą. **(Genetic studies on wheat).**
Acta Soc. Bot. Polon. 1946 : **17** : 61–93.

The tetraploid species of wheat with short empty glumes have a common factor *p* that determines the fundamental dimensions of the empty glumes and spikelets of these forms which have the type of ear designated *pp*; in the forms with long empty glumes the controlling factor is the allelomorph *P* and the type of ear *PP* results. Any character relating to the empty glumes or spikelets and differentiating one species with short empty glumes from a second, also having short empty glumes, is determined by additional factors, or one other factor, inherited independently of the factor *p*.

The factors *P* and *p* cause variations in the effect of certain factors which modify the dimensions of the empty glumes and spikelets, e.g. the effect of the factors resulting in thickening of the empty glume is greater in plants of the type *pp* than in those of type *PP*. All the tetraploid forms with long empty glumes are named *polonicoides* by the author, and correspond to the following tetraploid species with short empty glumes: (*a*) *polonicoides* with characters of *T. durum* (i.e. the species *T. polonicum*) corresponds to the species *T. durum*, (*b*) *polonicoides* with characters of *dicoccum* (*T. polonicoides*) corresponds to the species *T. dicoccum*, (*c*) *polonicoides* with characters of *T. turgidum* corresponds to the species *T. turgidum*, (*d*) *polonicoides* with the characters of *T. dicoccoides* corresponds to the species *T. dicoccoides*.

Any classification of wheats distinguishing between tetraploid forms of separate species with short empty glumes should include isolation of the corresponding forms with long empty glumes as separate individual species.

The factors *pp* determining the type of spikelet of the tetraploid species with short empty glumes also occur in the hexaploid species and produce the basic type of spikelet of these forms. Besides the complex of characters determining the spikelet of type *pp*, other characters distinguish the hexaploid species and may appear jointly with the type of ear *PP*. On crossing *T. polonicum* with *T. vulgare*, *polonicoides* forms were isolated with the characters of *T. vulgare*, but on crossing *T. polonicoides* with *T. Spelta* a form of *polonicoides* was isolated showing largely the morphological characteristics of *T. Spelta*.

The size of the grain characteristic for *T. polonicum* may be transmitted to tetraploid forms of the type *pp*; conversely in *polonicoides* forms the size of the grain may be reduced to the size characteristic for species, e.g. *T. dicoccum*, with short empty glumes. Whether such phenomena occur as a result of crossing-over or of independent inheritance of characters was not determined.

Hardness and vitreousness of the grain of *T. durum* are inherited independently of the characters relating to the type of spikelet *pp*, and are probably inherited together with the character of fragility of the empty glumes and of the rachis. E. W.

2174. 633.11:575,12:631.557(79.4)
Suneson, C. A. 633.11:581.6:575.12
**An evaluation of nine backcross-derived wheats.**
Hilgardia 1947 : **17** : 501–10.

The pedigrees are given of the following disease resistant wheats which have been produced in California by the back-cross technique: Big Club 37, Sonora 37, Pacific Bluestem 37, White Federation 38, Baart 38, Onas 41, Federation 41, Poso 42 and Big Club 43. Each variety was compared with its respective recurrent parent with regard to yield and quality, under the same conditions of disease and Hessian fly attack or their absence. A close approximation to the yielding capacity and quality of the parent wheats was shown by their back-cross derivatives.

2175. Savchenko-Belsky, A. [Savčenko-Beljskiĭ, A.] 633.11:575.127.5(47)
**New grain varieties. Tsitsin's perennial wheat.**
Soviet News 1948 : No. 1981 : p. 4.

An account is given of N. Cicin's [N. Tsitsin] work on perennial wheat-*Agropyron* hybrids and perennial hybrids of wheat, *Agropyron* and rye. In southern districts of the Soviet Union perennial wheat has been cultivated by collective farmers for a number of years;

from each sowing a grain harvest has been reaped annually for two or three years. Breeding work is now in progress to develop perennial wheats for other regions. Hybridization of wheat, *Agropyron* and rye is being carried out with a view to combining the baking quality of wheat, the relative resistance of rye to adverse conditions and the desirable characters of *Agropyron.*

New annual spring and winter wheat-*Agropyron* hybrids, are under test. No. 2285 is already being sown over a large acreage on the collective farms of the Moscow region.

Tsitsin is also reported to be carrying out investigations on the hybridization of *Elymus* with cultivated cereals, and of shrubs with herbs.

2176. *Fadrhons, J. 633.11:575.127.5:633.14(43.7)
Z praxe křížení : rostlin mezidruhový kříženec *Triticale Dobrovice.* (**On our practical experience with plant crossing : the interspecific cross *T. Dobrovice***).
Věstn. Čsl. Akad. Zeměd. 1947 : **21** : 379–83.

The simultaneous flowering of wheat and rye varieties to be used in crossing experiments was achieved by sowing Dobrovice spring wheat in autumn, sowing vernalized seed of Dobrovice winter rye in spring, and by planting grains of both cereals in pots in autumn and moving the pots so that the environmental conditions were altered. When flowering occurred the wheat ears were emasculated and pollinated with rye pollen. Ten grains were obtained in all, eight of them from crosses of spring wheat with rye, one from red Dobrovice wheat x rye and one from red Dobrovice 19 wheat x rye. The grains, which were shrunken and grooved across the dorsal side, resembled wheat in colour and rye in shape. They were sown in autumn, 1943, and gave rise to seven $F_1$ plants the ears of which emerged on June 7, 1944, four days before those of winter wheat which was growing next to them. The hybrids are designated *Triticale Dobrovice.* The $F_1$ plants were probably pollinated by the winter wheat. Microscopic examination of their own pollen showed that the nuclei were defective.

The average length of the stems of the $F_1$ was less and the average length of the ears greater than in either parent. Altogether the $F_1$ plants produced 138 grains, of which 108 were attacked by ergot, 8 resembled wheat and 22 resembled rye.

The chromosome number of the hybrid was $2n = 56$; the wheat and rye parents had $2n = 14$ and 42 respectively. $F_1$ plants were back-crossed to the wheat variety Carstens V, which has dense white ears. The progeny of the cross showed some resemblance to this variety.

In the $F_2$ no difference was detected between the plants from the wheat-like and rye-like grains, respectively. The grains from the $F_2$ resembled wheat grains in colour and were intermediate in shape.

The thousand corn weight and hectolitre weight of the $F_3$ grain were 43 and 80 respectively as compared with 48 and 83·2 for wheat growing in the vicinity.

The 1946 progeny of the back-cross with Carstens V which was made in 1944 included plants resembling this variety. The grain of the back-cross progenies became more and more like wheat in later generations.

The wheat-like $F_3$ plants had normal fertility except for those of a narrow-eared form in which the fertility was low.

2177. 633.11:575.42:575.148(47)
Jakubciner, M. M. 581.162.32:633.11
(**Variation in pure lines of wheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 77–79.

A number of instances are cited, from published and unpublished sources, in which selection within agricultural varieties of wheat has led to alterations in such properties as disease resistance, baking quality, time of maturity, winter hardiness and drought resistance. Instances are also given of natural crossing in wheat and of the production of new agricultural varieties by this means. It is concluded that cross-fertilization in wheat is more common than is often supposed.

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* An extended summary of this paper is on file at the Bureau.

2178. Moldenhawer, K. 633.11:576.16:575.115:575.114(43.8)
Ślady kultury rolnej w Wielkopolsce sprzed tysiąca kilkuset lat na podstawie wykopalisk w Luboniu pod Poznaniem. **(Traces of agriculture over a thousand years old in Poland discovered in archaeological diggings at Luboń near Poznań).**
Roczn. Nauk Rol. 1947 : **49** : 236–43.

Charred grain was found in pottery unearthed in 1939, in a seventh century settlement at Lubon. The amounts of the different species of grain were as follows: 22–23% *Triticum compactum* Host. (including the variety *globiforme*), 52–59% *T. vulgare* Vill. and 12–18% *Secale cereale* L.

According to Nilsson-Ehle the type *T. compactum* is conditioned by the presence of a dominant factor *C* and the author suggests that by segregation the older type *compactum* could give rise to *vulgare* as a recessive type, by loss of the factor *C*. In this way he explains the preponderance of *T. vulgare* over *T. compactum*. E. W.

2179. Unrau, J. 633.11:576.356.4:575.116.4
**The use of nullisomics in common wheat in associating genes with specific chromosomes.**
Genetics 1948 : **33** : p. 128. (Abst.)

Genetical investigations were carried out on the $F_2$ generations obtained by crossing nullisomics of the common wheat variety Chinese Spring with Federation 41 and Hymar. The nullisomics were previously obtained by E. R. Sears (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1152). The data indicated the following genes and their locations: the gene for red chaff in Federation 41 on chromosome I; the main gene for the club-headed character of Hymar on chromosome XX; and two main genes for winter habit in Hymar, one of which was located on chromosome IX. In addition, the presence of chromosomes IX was apparently associated with a repression of awning, while chromosome X appeared to carry genes promoting awn development. The $F_3$ generations are to be grown for further genetical analysis.

2180. Cillis, U. de 633.11:581.6(45)
La bianconatura dei grani duri. **(Softening of hard wheats).**
Pubbl. Staz. Sper. Granicolt. Sicilia 1942 : No. **10** : Pp. 67.

A thorough statistical study has been made of the familiar phenomenon in grains of *Triticum durum*, which in certain sets of conditions develop whitish patches of soft tissue and thereby lose their value for macaroni making. An experiment was made with six varieties of *T. durum* in which the completely normal and completely softened grains were sown separately; there was little or no difference in the proportion of softening in the progenies of the two sets. The grain from 20 plants taken at random in 47 different varieties of *T. durum* grown at Pantano Arci in Sicily was examined in 1935 and the varietal differences were shown to be significant. Climatic conditions in different years were shown to be a decisive factor in determining the amount of softening but differences between the varieties tended to persist in the different years.

2181. Josa, G. 633.11:581.6(45.8)
L'intenerimento del grano duro "Cappelli". **(Softening of the hard wheat Cappelli).**
Ital. Agric. 1948 : **85** : 138–43.

The wheat Cappelli is the most popular variety of *Triticum durum* in southern peninsular Italy and, under the name Bidi, in Sicily; but one of its defects is a tendency to produce grains with starchy patches instead of the normal vitreous consistency. An experiment is described in which 1000 normal ears were sown and gave rise to 18,396 normal grains and 589 grains with starchy patches. The phenomenon is therefore thought to result from environmental rather than genetic influences. The variety Cappelli was selected by Strampelli from an African *T. durum* and is in Italy probably outside its true area of climatic adaptation. The solution will be to select races of Cappelli free from the tendency to this defect, or better still races of the older varieties cultivated before the introduction of Cappelli, which seem to have been free from the defect altogether.

2182. Matweef, F. 633.11:581.6(61.1)
Causes de variation des indices extensimétriques des lots commerciaux de Florence-Aurore. **(Causes of variation of the extensometric indices of commercial samples of Florence-Aurore.).**
C.R. Acad. Agric. Fr. 1948 : **44** : 321–23.

The investigations reported show that the baking quality of wheat in Tunisia has been improved by the creation of new lines from the original Florence-Aurore wheat, and that the extensometric indices, while having a hereditary basis, are modified by environmental conditions. Further observations are added by F. Boeuf.

2183. Johnson, J. A.
Pence, R. O. and
Shellenberger, J. A. 633.11:581.6(78.1)
**Milling and baking characteristics of hard red winter wheat varieties grown in Kansas.**
Circ. Kans. Agric. Exp. Sta. 1947 : No. 238 : Pp. 24.

An analysis of milling and baking qualities was carried out on the following wheats: Tenmarq, Blackhull, Turkey, Early Blackhull, Chiefkan, Red Chief, Kanred, Cheyenne, Comanche, Pawnee and Wichita.

2184. Borasio, L. 633.11:581.6:578.08
Il lievitografo. Nuovo dispositivo per studiare la lievitazione e determinare la forza di panificazione delle farine. **(The lievitograph. A new device for studying the fermentation and determining the baking strength of flours).**
Quad. Staz. Sper. Risic., Vercelli 1944 : No. 27 : Pp. 55.

The various factors which influence the quality and flavour of bread are discussed in the first part of this monograph. All the many pieces of apparatus that have been devised for measuring the expansion of the dough during fermentation suffer from one common defect, that the dough is tested in conditions which differ materially from those under which bread is normally prepared. The method proposed by the author in the second part of the monograph consists in preparing dough from two lots of flour of 100 grm. each. Each piece of dough is placed on a glass plate in a hermetically sealed recipient and covered with a porous pot cover, the base of which rests in a solution of 23% NaCl or KOH, by which means the atmosphere is maintained at 80% humidity, which is the optimum for fermentation. The two recipients, the one with NaCl and the other with KOH, are placed in a thermostat and maintained as nearly as possible at a temperature of 30° C.; each is connected with a volumometer. The respective volumes of the two increase equally for some time, until the maximum fermentation is attained; at this point the dough begins to lose consistency and the gas escapes. The KOH absorbs the gas and in this apparatus there is no further increase in volume. In the other the volume increases until no more gas is evolved. The curves for the two determinations are plotted or registered directly if suitable self-recording volumometers are used. In this way the fermentation time, the total gas evolved, the amount retained by the dough and the maximum volume of the dough attained are all determined under conditions in which the dough is subjected to no external support but lies freely in a moist atmosphere.

2185. Kramer, H. H. and
Albrecht, H. R. 633.11:581.6:578.08
**The adaptation to small samples of the pearling test for kernel hardness in wheat.**
J. Amer. Soc. Agron. 1948 : **40** : 422–31.

Experiments were carried out to determine: (1) the lower limit of sample sizes in the pearling test which will give reliable results; (2) the effect on the pearling index of samples consisting of mixtures of hard and soft wheats, such as would be found in samples of segregating generations; and (3) the changes required in pearling time as the sample size is reduced in order to keep the pearling index within reasonable limits. In addition, the effect of moisture content in soft wheats upon the pearling index was investigated. A method of adjusting pearling indices for small samples to standard values is proposed, and the value of the test in breeding work is indicated.

2186. MATWEEF, M. 633.11:581.6:578.08(61.1)
Valeur industrielle des blés durs tunisiens et méthodes utilisées pour son appréciation. **(Industrial value of Tunisian hard wheats).**
Ann. Serv. Bot. Agron. Tunis 1946 : **19** : 35–76.

The commercial and agronomic qualities desirable in hard wheats are discussed and methods of measuring them described. Finally, the results are presented of the application of these methods to the principal Tunisian varieties, namely, Mahmoudi 552, Sindyouk x Mahmoudi 870, Chili, Sbéi 292 and Biskri AC2, with Amber Western used as a standard variety. The material used was harvested in 1940, 1941 and 1942.

2187. FAJERSSON, F. 633.11–2.111–1.521.6:575(48.5)
Höstvetematerialets övervintring på Weibullsholm 1946–1947. **(Over-wintering of the autumn wheat material at Weibullsholm 1946-47).**
Agri Hortique Genetica, Landskrona 1947 : **5** : 116–33.

The winter hardiness of some of the more important wheats, e.g. Iduna, Standard and Standard II, Äring II and III, Eroica, Skandia II and III and Hansa is discussed. Separate consideration is given to a comparison of the hardiness of Eroica, Ergo and Virtus, and to the over-wintering of (1) some unnamed varieties from the cross Eroica x Virtus and (2) line selections from Eroica and Weibull's 7072 from [Bankut 178 x (Ankar and Saxo)] x Äring.

The effect of soil, time of sowing and parasite attack (cf. Abst. 1506) on over-wintering capacity is discussed.

Virtus is stated to be very hardy and Weibull's 11556 and 11746 from crosses between Eroica and Virtus are specially promising.

Some strains from Eroica, Weibull's 11310 in particular, have proved hardier than the parent variety.

2188. FAJERSSON, F. 633.11–2.111–1.521.6:631.4(48.5)
Jordartens betydelse för övervintringen. **(The influence of the kind of soil on over-wintering).**
Lantmannen 1948 : **32** : p. 303.

The subject is briefly discussed with reference to winter conditions in Sweden in 1947–48 and varietal differences in reaction to such conditions and different kinds of soils.

2189. FELLOWS, H. 633.11–2.183
**Falling of wheat culms due to lodging, buckling, and breaking.**
Circ. U.S. Dep. Agric. 1948 : No. 767 : Pp. 16.

Terms used to describe the various conditions of falling of wheat culms are defined, and the different causes of lodging, buckling (including crinkle joint) and breaking of the culms are examined.

2190. EL-HELALY, A. F. 633.11–2.452–1.521.6(62)
**The prevention of black stem rust of wheat.**
Phytopathology 1948 : **38** : 161–84.

The occurrence and distribution of black stem rust (*Puccinia graminis* Pers.) on wheat in Egypt are described. Experiments are reported on the effect of cultural conditions upon the incidence of the disease and on control by various fungicides. Observations made at Dokki and elsewhere during 1941–42 on varietal susceptibility revealed that the Baladi varieties are comparatively resistant or immune, and the Hindi varieties susceptible.

2191. ABBASI, F. H. 633.11–2.452–1.521.6:575(54)
**Effect of combination of mature plant and physiologic resistance to stem rust on yield of wheat.**
Indian J. Genet. Pl. Breed. 1946 : **6** : 11–18.

$F_4$ lines of the cross Premier [Ceres x (Hope x Florence) x Canadian Rust Laboratory No. 625] x Kenya R.L. 1373 and third-year selfed progenies of the second back-cross of this hybrid with Premier were studied, with a view to examining the effect of combining the mature plant resistance to stem rust possessed by Premier and the physiological resistance of Kenya R.L.1373. The data from the $F_4$ lines gave no indication that the addition of physiological resistance to mature plant resistance was of greater value than mature plant resistance only. The back-cross lines possessing both types of resistance gave a slightly better performance than those possessing only mature plant resistance; but the number of comparisons was not large and the data are not considered to be conclusive.

2192. Sears, E. R. and
Rodenhiser, H. A. 633.11–2.452–1.521.6:576.356.4:575.11
**Nullisomic analysis of stem-rust resistance in *Triticum vulgare* var. Timstein.**
Genetics 1948 : **33** : 123–24. (Abst.).

The common wheat variety Timstein, derived from a cross involving *Triticum Timopheevi*, is resistant to most races of black stem rust. The data from crosses between nullisomics of the variety Chinese Spring (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1152) and Timstein reveal that Timstein carries two dominant complementary genes for resistance to race 56, both located on chromosome X. The data also suggest that resistance to race 17 depends upon the same two genes, but in this case the genes only exhibit partial dominance. Tests on material back-crossed to the nullisomics for chromosome X indicate that the resistance of Timstein to race 139 may also depend upon chromosome X.

2193. Peturson, B.,
Newton, M. and 633.11–2.452–1.521.6–1.557(71)
Whiteside, A. G. O. 633.11–2.452–1.521.6:581.6(71)
**Further studies on the effect of leaf rust on the yield, grade, and quality of wheat.**
Canad. J. Res. 1948 : Sect. C. : **26** : 65–70.

Light infections of leaf rust showed little or no effect upon commercial grade, but it was found that heavy infections, when other factors affecting grade were not operative, may cause reduction in grade, chiefly by lowering bushel weight. Leaf rust infection evidently has a marked effect upon the carotenoid content of the grain, rusted samples in every test being appreciably higher in carotenoid content than non-rusted samples. Usually the infected samples were lower in protein percentage than the non-rusted samples but possessed in most cases greater baking strength and produced loaves of greater volume than did the non-rusted samples; the rust infection apparently modified protein quality in a favourable direction. The effects of leaf rust infection on kernel weight, bushel weight, and yield were more pronounced than those on quality and grade; even moderately light infections caused appreciable reductions. The importance of developing approved commercial bread wheat varieties with a high degree of resistance to leaf rust is emphasized; work with this aim in view is at present in progress.

2194. Platt, A. W.,
Farstad, C. W. and
Callenbach, J. A. 633.11–2.7–1.521.6(71+78.6)
**The reaction of Rescue wheat to sawfly damage.**
Sci. Agric. 1948 : **28** : 154–61.

Information is given on the reaction of the hard red spring wheat Rescue to sawfly (*Cephus cinctus*); it was developed from a cross between Apex and the New Zealand variety S-615, as a solid-stemmed, sawfly resistant wheat (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1053). In nursery trials during the period 1943–47 in Alberta and Saskatchewan, Rescue has shown a high degree of sawfly resistance, except at the Regina station. In varietal tests carried out in south-western Saskatchewan during 1946 and 1947, the variety exhibited satisfactory resistance at 13 out of 14 stations. In field observations made in Alberta, Saskatchewan and Montana during 1946 and 1947, Rescue proved highly resistant at all locations. Nursery trials were also conducted in Montana in the years 1945 to 1947; in some of these tests the sawfly resistance of Rescue was satisfactory, but in others the variety proved relatively susceptible. The causes of the variation in reaction to sawfly are not known. Various possible reasons are at present under investigation. These include inherent differences in sawfly populations; environmental effects upon the expression of the character of solid stems; variations in the nutrition of the plant which, in turn, may affect the nutrition of the sawfly; and the technique of conducting nursery trials.

2195. VALLE, O. 633.11.00.14(47.1)
Diamantvårvetets betydelse för veteodlingen i Finland. **(The importance of Diamant spring wheat for wheat cultivation in Finland).**
Sverig. Utsädesfören. Tidskr. 1948 : **2** : 53–63.

This paper discusses the development of wheat growing in Finland, wheat cultivation in Finland and Sweden, spring wheat trials in Finland and the relative value of Diamant and Diamant II in Finnish agriculture with special reference to soil conditions.

2196. HARRIS, R. H.,
SIBBITT, L. D.,
WALDRON, L. R. and
STOA, T. E. 633.11.00.14(76.4)
**Comparative effects of season, location, and variety on the yield and quality of North Dakota hard red spring wheat.**
Bull. N. Dak. Agric. Exp. Sta. 1947 : No. 342 : Pp. 18.

Experiments with the hard red spring wheat varieties Regent, Thatcher, Rival, Mida and Pilot at five locations in North Dakota from 1941 to 1945 showed, among other things, that varieties react differently, especially as regards yield and protein content and quality, to changes in environment. It is important therefore that new varieties be tested for a number of years before being released.

2197. 633.11.00.14(94.5)
MCKEON, B. F. 633.25.00.14(94.5)
**Cereal investigations in the Wimmera.**
J. Dep. Agric. Vict. 1948 : **46** : 73–81.

An account is given of tests on wheat varieties and new selections and hybrids conducted in 1947 at the Longerenong Agricultural College and other centres in the Wimmera district, Victoria. The chief varieties tested included Pinnacle, Quadrat, Diadem, Ghurka, Magnet, Baldmin, Insignia, Bencubbin and Pindar. Wheat and oat varietal grazing trials are also described.

2198. WATSON, H. C. H. 633.11.00.14(94.5)
**Cereal tests in the northern districts.**
J. Dep. Agric. Vict. 1948 : **46** : 97–104.

An account is given of wheat varietal tests conducted at Dookie Agricultural College, Rutherglen Research Station and various farm centres in the northern districts of Victoria. The stages of hybridization and $F_1$ hybrid selection in wheat breeding are carried out at the State Research Farm, Werribee. Selection of the $F_2$ and subsequent generations is effected at the various experimental stations throughout Victoria.

The following varieties are under test in the Senior Yield Trials in the northern districts: Quadrat, Magnet, Pindar, Pinnacle, Ghurka, Baldmin, Bencubbin, Ranee 4H, Insignia, Diadem, Regalia, Javelin, Ghurka x Amity, Ghurka x Pusa 4, and Ghurka x C.M.G. Descriptive notes are given on these varieties, with the exception of the three last named, and varietal recommendations are made for the different northern districts.

## OATS 633.13

2199. HEYNE, E. G.,
JOHNSTON, C. O.,
HANSING, E. D. and
CLAPP, A. L. 633.13(78.1)
**Osage and Neosho oats.**
Circ. Kans. Agric. Exp. Sta. 1947 : No. 242 : Pp. 15.

The characteristics of the oat varieties Osage and Neosho are described in detail (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 279).

2200. 633.13:575(48.1)
633.11:575(48.1)
Eng, H. 633.16:575(48.1)
Noen betraktninger om sortvalget i korn. (**Some considerations regarding the choice of varieties of cereals**).
Samvirke, Medd. Felleskjøpet, Oslo 1948 : **43** : 85–88.

The writer compares the agricultural value of some of the newer Swedish and Norwegian varieties of oats, barley and spring wheat for farming conditions in different parts of Norway. Among the successes of Norwegian plant breeders are the oats, Hein and Hein II, and the new spring wheat Ås II bred by Prof. Vik.

Earliness and stiff short straw which will stand heavy manuring are important features which the plant breeder must try to combine with as high yield as possible.

2201. 633.13:575(48.5)
Förädlingsarbeten på Svalöv med extremt tidig svarthavre samt Orionhavre III. (**Breeding work at Savlöf with extremely early black oats and the Orion III oat**).
Försök och Forskning 1947 : **4** : p. 22.

This is a note on the work already recorded by Å. Åkerman (cf. Abst. 1558).

2202. Koczwara, M. 633.13:582:581.9
*Avena Besseri* Grisebach i formy pokrewne. (***A. Besseri* Grisebach and closely related forms**).
Acta Soc. Bot. Polon. 1946 : **17** : 253–72.

The history and early nomenclature of *A. Besseri* Grisebach are fully discussed. This oat is compared with Lessing's *A. desertorum*. Samples of the latter from Irkutsk and of *A. Besseri* from Polish and Czech sources are described in detail and certain distinct differences existing between the Polish and Russian oats indicate that the Polish oat should be restored to its former classification as a good species.

Another oat from Czech and Moravian sources has been classified as belonging to *Avenastrum desertorum* but the author maintains its structure is similar, not to Lessing's oat, but to Besser's.

The geographical distribution of *A. Besseri* and *A. desertorum* and associated species is discussed in detail. E. W.

2203. Brown, E.,
Stanton, T. R., 633.13–1.531.16:581.142
Wiebe, G. A. and 633.16–1.531.16:581.142
Martin, J. H. 633.174–1.531.16:581.142
**Dormancy and the effect of storage on oats, barley, and sorghum.**
Tech. Bull. U.S. Dep. Agric. 1948 : No. 935 : Pp. 30.

A report is given of experiments on numerous varieties of oats, barley and sorghum carried out to study (1) the effect of storage conditions upon the after-ripening process; (2) the effect of different temperatures upon the germination of freshly harvested seed; and (3) varietal differences in dormancy.

2204. Holton, C. S. and
Rodenhiser, H. A. 633.13–2.451.2:576.16:631.521.6(73)
**Physiologic specialization in the oat smut fungi and its relation to breeding oats for smut resistance.**
Tech. Bull. U.S. Dep. Agric. 1948 : No. 952 : Pp. 16.

Collections of *Ustilago Avenae* and *U. Kolleri* and species mixtures from various parts of the U.S.A. and Canada were tested on different oat varieties. On the basis of the reactions of nine varieties of *Avena sativa* and one of *A. byzantina*, 22 smut races were differentiated. These races were found to be distributed in 28 states of the U.S.A.

The reactions of 28 varieties and 19 hybrid selections of oats to the 22 smut races are reported. Nine varieties and 13 hybrid selections tested were completely smut free, and several of the others were highly resistant to all or to the majority of the smut races.

2205. Krüger, U. 633.14:575.14:575.74:581.162.32
Die Wirkung einer Bestäubungsbeschränkung beim Roggen und ihre Erklärung. (**The effect of limitation of pollination in rye and the explanation**).
Züchter 1947 : **17-18** : 146–53.

When rye is bred by crossing inbred lines, by single pair crossing and by the isolation of élite lines, the yield is found to decline. H. Nilsson evolved his plasma theory of inbreeding to explain these reductions in yield. The author tested the necessity for applying H. Nilsson's plasma theory to inbreeding of rye. Her initial material was a random selection of 250 plants of Petkus winter rye. Residual seed of the initial material was taken as the standard for comparison. Single pair crossing and investigation of élite lines were carried out; then in successive generations, vigour of growth and intensity of colour, due to chlorophyll content, were noted; in addition the number and length of stems, weight of grain and germination capacity were estimated quantitatively.

Generally the results showed that in the first generation the different degrees of limitation of pollination, which occur in single pair crossing and crossing within élite lines, produced no differences from the standard, but in the second generation, in both cases, the yield was lowered and marked decreases were observed in the average germination capacities, as compared with the values for the standard population.

The results obtained from these practical methods have now been compared with the findings from "model" experiments assuming first the presence of independent dominant genes; lack of agreement, however, between the practical and theoretical results proved that the depression of yield cannot be due to the action of such genes. Further "model" experiments, made on the basis of Jones's linkage hypothesis, concerning depression of yield from inbreeding, showed that the depressions in yield which occur on limiting the pollination of rye are easily explicable on this hypothesis and therefore rye follows the same laws as maize, so that application of the plasma theory of inbreeding is unnecessary. E. W.

2206. 633.14:575.14:576.356:581.162.5
Müntzing, A. and 633.14:575.14:576.354.46
Akdik, S. 633.14:575.14:576.312.2
**Cytological disturbances in the first inbred generations of rye.**
Hereditas, Lund 1948 : **34** : 485–509.

Rye plants of the variety Stål [Steel] were inbred for several generations, and population plants of the same variety were grown as controls. In the first inbred generation, chromosome pairing was almost normal, but in the second and third it was very variable and, on an average, reduced. There were significant differences in pairing values both between families derived from different $I_1$ plants and between the different inbred lines. The pairing values of mother plants and offspring showed a positive correlation. Nucleic acid deficiency in the chromosome of $I_3$ and $I_4$ and a few $I_2$ plants was indicated by poor staining, and this was correlated with reduced vigour in some of the $I_4$ plants. Other anomalies observed at meiosis in the inbred plants included spindle abnormalities, the presence of supernumerary bivalents, and fragmentation. Some of the pollen mother cells had two nuclei.

Male and female fertility and also plant height were positively correlated to the degree of chromosome pairing.

The causes and effects of meiotic instability in inbred lines are discussed. Reduced pairing is attributed to the depressed vigour of inbreds and to gene action. Since the degree of pairing is positively correlated with fertility, reduced pairing will contribute to the extinction of certain lines. The segregation of the recessive genes responsible for the degeneration of inbreds will be disturbed by the meiotic irregularities, which, in rye, are characteristic of inbred material from the second generation onwards. These irregularities will also prevent lines from becoming homozygous and constant.

It is not known whether the rather pronounced cytological effects of inbreeding observed in rye are of general occurrence, but similar effects have been observed in *Alopecurus myosuroides*.

2207. MÜNTZING, A. 633.14:576.356.4:576.356.1

**Cytological studies of extra fragment chromosomes in rye. V. A new fragment type arisen by deletion.**

Hereditas, Lund 1948 : **34** : 435–42.

The appearance and meiotic behaviour of the accessory chromosomes in a rye plant containing two of them are described. One accessory chromosome was a standard fragment and the other had been formed from a standard fragment by deletion of a segment from the long arm.

The progeny from crosses of the plant with another having $2n = 14 + 1$ standard fragment included ten plants with $2n = 14$, seven with $2n = 14 + 1$ deleted fragment, two with $2n = 14 + 2$ standard fragments and one with $2n = 14 + 2$ standard fragments $+ 1$ deleted fragment. Open pollination of the original plant with plants having $2n = 14$ resulted in 24 plants with $2n = 14$, one with $2n = 14 + 1$ standard fragment, seven with $2n = 14 + 1$ deleted fragment and three with $2n = 14 + 2$ standard fragments. These results are in accordance with the non-disjunction of the standard fragment at the first pollen and embryo sac mitoses but show that this phenomenon does not occur in the case of the deleted fragment, since this was found singly in all the 15 plants possessing it. In the second generation, just one case of non-disjunction of the deleted fragment was detected.

The behaviour of the deleted fragments at meiosis and pollen mitosis in the offspring of the original plant is described. The deleted fragment was observed to divide regularly at pollen mitosis.

The average sizes of the deleted fragment and the standard fragment in somatic plates of the original plant were 7·36 units and 13·64 units respectively, each unit corresponding to 0·24 $\mu$. Corresponding values in the offspring of the first and second generations were 8·28 and 13·96 units. It is concluded that the deleted fragment resulted from the loss of about half the long arm of the standard fragment. Inter-plant variation in the length of the standard fragment is attributed to variation in the degree of chromosome contraction, and while the same cause must account for at least part of the variation in length of the deleted fragment, it is thought that structural variation might also be involved.

It is pointed out that the coincidence of the lack of a segment of the long arm and the absence of non-disjunction in the new fragment strongly supports the hypothesis that non-disjunction in the standard fragment is caused by a special segment in the long arm.

2208. ANTROPOV, V. I. and
ANTROPOV, V. F. 633.14:582

Sinópsis de las especies y variedades del género *Secale*. **(Synopsis of the species and varieties of the genus *Secale*).**

Rev. Argent. Agron. 1948 : **15** : 33–52.

A synopsis in Spanish is presented of the classification of *Secale* devised by V. I. and V. F. Antropov (cf. *Plant Breeding Abstracts*, Vol. IX, p. 363).

## MAIZE 633.15

2209. FROLIK, E. F. and
MORRIS, R. 633.15:539.185.9:575.243

**Inducing endosperm changes in maize with neutron irradiation of pollen.**

Genetics 1948 : **33** : p. 105. (Abst.)

Maize tassels of plants of the genotype *A Pr Su* were exposed to different periods of neutron irradiation in the thermal neutron column of a heavy water pile. Pollinations were made on untreated plants of the genotype *a pr su*, and the effects on the resulting kernels were studied. The neutron irradiation resulted in an increased number of mutations of the *A*, *Pr* and *Su* loci, affecting the entire tissue involved, but had no significant effect on the number of chimaeras produced or the percentage of mutated kernels obtained upon recovery. The percentage of defective kernels increased consistently with duration of treatment.

2210. Bogyó, T. P. 633.15:575.12(43.91)
A korszerü kukoricanemesités. (**Modern maize breeding**).
Budapest 1947 : Pp. 64. 6 figs.

The methods of hybrid maize breeding in the United States of America are described, following the conference of hybrid maize production arranged by the F.A.O. at Bergamo, Italy, in July and August 1947. An extensive bibliography is included. The publication contains the following chapters: I. Maize in America. II. Theory of inbreeding and heterosis. III. Methods of breeding and producing hybrid maize. IV. Organization of the breeding work in America. V. Prospects of breeding hybrid maize in Hungary. In the author's view hybrids developed in Hungary will be the most suitable, but until this can be achieved the best adapted American hybrids must be used, either by importing double cross seed, or importing single crosses and producing double crosses in Hungary. Special attention is drawn to the need for preserving valuable genetic material by maintaining old Hungarian varieties.

2211. Bogyó, T. P. 633.15:575.12(43.91)
A heterózis- vagy hibridkukorica előállitásának módszerei. (**Methods of producing hybrid maize**).
Mezögazdaság és Ipar 1948 : **2** : 19–23.

The methods of hybrid maize breeding and production are described, with photographs showing the most suitable times for detasselling and pollination. On the question of introducing hybrid maize into Hungary a warning is given to the authorities not to spoil the reputation of hybrid maize among peasant farmers by calling intervarietal hybrids or anything "hybrid maize", except real hybrid maize, because such a mistake could set back the introduction of hybrid maize by another thirty years.

2212. Fenaroli, L. 633.15:575.12(45)
**Hybrid corn program in Europe.**
F.A.O. European Bull. 1948 : No. **5** : 358–61.

A report is presented of the results of experiments on hybrid maize production in Italy (cf. Abst. 2213). In addition, a brief account is given of the Hybrid Corn School held at Bergamo under the auspices of FAO in summer 1947.

2213. Fenaroli, L. 633.15:575.12(45)
I granoturchi ibridi. (**Hybrid corns**).
Ital. Agric. 1948 : **85** : 146–69.

An essay on the principles and methods of hybrid corn production in the U.S.A. is presented, followed by a report on the results obtained in different parts of Italy with a collection of American hybrids supplied for the purpose by U.N.R.R.A. and F.A.O. Local open-pollinated varieties served as controls. The hybrids in general were less adversely affected by strong winds and by hail than the control varieties. In yield the majority of the hybrids were also superior, even to the best open-pollinated varieties in the localities in which they were tested; the differences varied at the different localities; thus at Bergamo the best hybrids yielded 36·8% more than the best open-pollinated variety, at Savigliano 42·9%, at Aquileja 66·2% and at Brembio 127·3% more. Plans for the further utilization of hybrid corn in Italy are outlined.

2214. Jenkins, M. T. 633.15:575.12(73+71)
**Report of the ninth Corn Improvement Conference of the North Central Region.**
Div. Cereal Crops Dis.; Bur. Pl. Indust. Soils Agric. Engin.; Pl. Indust. Sta. Beltsville, Md 1948 : Pp. 52. (Mimeographed).

Summaries are given of maize, sweet corn and popcorn hybrid breeding work, including the techniques used, in progress at 13 states in the United States, and at the Harrow and Morden Stations, Canada.

The reports are also presented of the respective Committees on the following fields of investigation: the selection of inbred lines for the Early Uniform Tests; the designation of inbred lines and hybrids; the Midseason Uniform Tests; Late Uniform Tests; the preservation of germ plasm; uniform methods of reporting disease readings; and uniform methods of reporting insect ratings.

2215. KALINIK, M. S. 633.15:575.125(47)
**(Maize hybridization).**
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 22–24.

In the Dnepropetrovsk area the average yield of grain over a three-year period was 28·2 c. per ha. for the hybrid Brown County x Gruševskaja, the yields of the respective parent varieties being 25·4 and 23·5 c. per ha. In a number of other areas in the Ukraine, a yield increase of 13% over the average of the parents and 9–10% over that of Brown County was observed. Similar results were obtained with hybrids of Minnesota 13 Extra x Gruševskaja.

It is calculated that a yield increase of 0·5 c. per ha. would repay the extra cost of producing hybrid seed.

Still larger increases in yield have been obtained from crosses between inbred lines. Thus the variety Gruševskaja gave an average yield of 24.2 c. per ha., the variety Sterling 27·7, the hybrid between them 28·8, while two hybrids between inbred lines of these varieties yielded 30·4 and 30·0 c. per ha. respectively. Similarly Brown County yielded 16·0 c. per ha., Gruševskaja 14·0, their hybrid 16·7, while the hybrid between two inbred lines of these varieties yielded 25·2 c. per ha.

A double cross between two American hybrids yielded 3·8 c. per ha. (9%) more than the variety Sterling. Even top-cross hybrids have proved more productive than ordinary intervarietal hybrids; thus a cross of Brown County x an inbred line of Gruševskaja yielded 46·2 c. per ha., whereas the ordinary hybrid of Gruševskaja x Brown County yielded only 42·2 c. per ha. The top-cross method is preferred because it is easier and cheaper, since the Brown County inbreds are very feeble and difficult to maintain.

The above hybrids have given better results than any hybrids introduced directly from the U.S.A.

2216. SALAMOV, A. B. 633.15:575.125(47)
**(Intervarietal hybridization in maize).**
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 25–32.

Intervarietal maize hybrids were first made in 1930, and out of 105 hybrids tested from 1931 to 1935, 51 were higher than the standard variety, Sterling, in yield and 51 were below. The best hybrid was Sterling x Mestnaja Belaja Kremnistaja [Local White Flint], with a yield of 11% above that of Sterling. Several other hybrids were promising and most of them were better than Sterling in standing capacity. Frequent differences between reciprocal hybrids were observed. In 60% of the hybrids the yield exceeded that of both parents, and none of them ever yielded less than the maternal parent when both parents were varieties well adapted to the locality of the trials. The full data of the results show that the hybrids were mostly intermediate in time of maturity, with a tendency to approach the seed parent more than the pollen parent in both this and other characters.

The second generation was examined in four of the hybrids and the yields were compared again with those of the standard Sterling. Only one of the hybrids showed a reduction of yield from the first to the second generation, and no appreciable diminution was observed in the third and later generations of some hybrids; for instance the hybrid Mestnaja Belaja [Local White] x Sterling, after five generations of open-pollination and mass selection, outyielded Sterling by 26·4%.

In an editorial note it is pointed out that the best hybrids were those between a local variety and a well adapted imported variety, and attention is called to the success obtained with open-pollination, ascribed to the possibilities for selective fertilization that this presents.

2217. EIGSTI, O. J.,
HARDEN, J. W. and
SEARS, L. W. 633.15:575.2:575.14
**A study in variation within linebred corn populations.**
Genetics 1948 : **33** : p. 103. (Abst.)

A brief survey is given of the variability of line bred maize plants. The variants observed upon selfing are unlike the general type of plant characterizing the line, and include types which resemble known mutants in maize, e.g. albino seedling and tassel anomalies, and physiological variants which are the basis of improvements in hybrid performance as regards resistance to adverse conditions and other characters.

2218. Brown, W. L. 633.15:576.16(73)

**The history of corn belt maize in relation to the inbreds derived from it.**

Genetics 1948 : **33** : 98–99. (Abst.)

Historical, archaeological and cytological evidence has led to the conclusion that the dent maize varieties commonly cultivated in the corn belt of the United States before modern hybrid maize were produced by mixing two different kinds, the "Northern flints" and "old Southern dents". Varieties of the former group have slender ears with eight to ten rows of wide kernels, and slender culms and tassels; their chromosomes are distinguished by 0 to 2 knobs. The latter group have short ears with 16 rows of elongated kernels, and stout culms and tassels; their chromosomes possess 6 to 12 knobs. Mixing of these two types continued actively until 1850, gradually giving rise to such varieties as Leaming and Reid. Inbreeding of these open-pollinated varieties has resulted in inbreds representing a series of recombined characters from the two types, with chromosome knob numbers ranging from one to eight. Some inbreds represent recombinations differing but slightly from the original dent varieties, while others are similar to the Northern flints. There are indications that differences in knob number are correlated with some of the morphological differences between the Southern dents and Northern flints.

2219. Randolph, L. F. 633.15:576.354.4:575

**Inherited differences in pachytene configurations in maize.**

Genetics 1948 : **33** : p. 121. (Abst.)

Inbred lines and open-pollinated varieties have been found to differ in the suitability of their pachytene figures for an analysis of chromosome configurations. Some lines were found to be segregating for the quality of their pachytene figures as well as for identifying markers on the chromosomes. The temperature range of 15 to 35° C. during fixation, the climatic conditions occurring at the time of collecting the samples, the proportions of alcohol and acetic acid in the fixing fluids, and the time of day at which the samples were collected had relatively little influence on the quality of the pachytene figures. Certain crosses between two lines with good quality produced $F_1$ hybrids with equally good pachytene figures. Hybrids consisting of combinations of lines with good and inferior pachytene figures had inferior or intermediate figures. Back-crosses to the parent line with good figures produced progenies which did not segregate clearly and in which the intermediate class predominated, suggesting that more than one major gene may be involved in determining the type of pachytene figure.

2220. 633.15:576.356.2:581.162.51

Burnham, C. R. 633.15:576.356.2:575.116.1

**Cytogenetic studies of a translocation between chromosomes 1 and 7 in maize.**

Genetics 1948 : **33** : 5–21.

A naturally occurring semi-sterile line of maize, heterozygous for an interchange between chromosomes 1 and 7, designated T1–7a, is described. Usually the line shows a ring of four chromosomes at diakinesis, only about 2% of chains being observed. Pollen counts on 17 plants heterozygous for T1–7a averaged 48% of aborted grains. The data from counts on three plants gave 51% ovule abortion. The progeny of semi-sterile plants contained 0·8% of plants with $2n + 1$ chromosomes; less than 1% of pollen or ovule sterility is thus accounted for by the frequency of 3–1 disjunction in the ring. A stock homozygous for the interchange, isolated in the progeny of a self-pollinated semi-sterile plant, had normally filled ears and normal pollen. From crosses between the semi-sterile line and normal plants, a ratio of 1 normal: 1 semi-sterile plant was obtained.

A cross-shaped synaptic figure was observed at mid-prophase of meiosis in plants heterozygous for the interchange. The "cross" involved the longer arms of both chromosome 1 and chromosome 7. In a large percentage of the meiotic figures obtained there was considerable asynapsis at the centre of the cross. On the average, 18·7% of the long arm of chromosome 7 and 12·4% of the long arm of chromosome I were asynapsed. The length of the interchanges were determined as follows: 82·6 ± 5·6% of the long arm of chromosome 7, and 57·6 ± 9·7% of the long arm of chromosome 1. The breaks were at about L.17 and L.42 of chromosome 7 and 1, respectively. In chromosome 1 the break occurred between locus *br* for the brachytic dwarf character and the locus *f* for the character of fine striped leaf. The probable order of loci was found to be *br*–(T1–7a) *f*–*an*–*bm*2, the locus *an* being for the character of anther ear dwarf, and *bm*2 for the character of brown midrib of the leaf. For chromosome 7 the linkage data suggested the order *v*5–(T1-7a)–*ra*–*gl ij*, with the three latter genes in the exchanged piece. The genes *v*5, *ra*, *gl* and *ij* are for the characters virescent seedling and fine striped leaf, ramosa tassel and ear, glossy leaf-1, and "iojap" striped seedlings and plant respectively.

2221. ROMAN, H. 633.15:576.356.4:576.37
**Selective fertilization in maize.**
Genetics 1948 : **33** : p. 122. (Abst.)

The two gametes of a single pollen grain of maize are not genetically identical in pollen produced from plants which carry an interchange between a B type of chromosome (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 454, and Vol. XVIII, Abst. 1578) and a chromosome of the basic set. The interchange chromosome bearing the B type centromere undergoes non-disjunction in the second mitosis of the microspore. Thus one of the gametes has two interchange chromosomes and the other none. Selective fertilization has been found to occur among the hyperploid and deficient gametes, the egg receiving the former much more frequently than the latter. The extent of selective fertilization varies with the pollen parent used in the cross and also with the female parent. In some crosses, the hyperploid gamete has as much as a 2 : 1 advantage over the deficient gamete. Crosses involving plants with intact B type chromosomes, without structural rearrangements, show a similar behaviour, the gamete with two B types having a selective advantage over the gamete with none. This may account for the persistence of the B type in certain maize strains, in opposition to decided selection pressure against its survival.

2222. RICHEY, F. D. and 633.15:577.16:575.11
DAWSON, R. F. 633.15:577.16:575
**A survey of the possibilities and methods of breeding high-niacin corn (maize).**
Plant Physiol. 1948 : **23** : 238–54.

The niacin (nicotinic acid) concentrations of varieties of white dent maize are given. They differ widely in this respect, southern varieties tending to contain more niacin than northern ones. It was found, however, that environmental differences play very little part in determining differences in niacin content. The genetic differences, moreover, are not only intervarietal but intravarietal, the range of concentrations for the white inbred lines tested being 13·9 to 53·3 micrograms per gram, that for yellow inbreds 15·6 to 30·8 micrograms per gram and that for 6 Tennessee lines, all out of Neal Paymaster, 18·0 to 53·3 micrograms per gram. Single-cross and double-cross hybrids tended to be intermediate between the parents and to resemble the female rather than the male parent in their niacin concentrations. There are, however, a few exceptions to this condition, which suggest that complicating mechanisms may exist. Although less than that of the female parent, the influence of the male parent is sufficient to necessitate controlled pollination in experiments dealing with niacin concentration. The results reported in this paper together with those of other authors show that niacin content is inherited in two ways. One is by multiple factors with small individual effects. The other involves the *Su* and *su* genes, the *Su* (starchy) gene being dominant for lower niacin concentration over its *su* (sugary) allelomorph. This dominance would seem to be a secondary pleiotropic effect. Analysis of samples of waxy corn indicated that the *wx* gene might also tend to increase the niacin content slightly, but further research is necessary in this connexion. Selection for high and low niacin contents respectively was made in three selfed generations of Huffman, and families with high and low niacin contents were obtained. The results of crosses among some of the Huffman strains rich in niacin suggest that lines with at least 50 micrograms per gram could be obtained and could be used to produce hybrids with high niacin content which were satisfactory in other respects too. The general lines which breeding for high niacin content should follow are briefly indicated.

2223. JONES, M. D. and 633.15:581.162.3:578.08
NEWELL, L. C. 633.287:581.162.3:578.08
**Longevity of pollen and stigmas of grasses: buffalo-grass, *Buchloe dactyloides* (Nutt.) Engelm., and corn, *Zea mays* L.**
J. Amer. Soc. Agron. 1948 : **40** : 195–204.

Experiments are reported on the longevity of the pollen of buffalo grass and maize when stored by different methods and on the duration of the receptivity of the stigmas.

2224. JOSEPHSON, L. M. and 633.15:581.162.51:575(73)
JENKINS, M. T. 633.15:581.162.51:575.182
**Male sterility in corn hybrids.**
J. Amer. Soc. Agron. 1948 : **40** : 267–74.

Poor seed set occurred in fields of several different white maize hybrids in crops raised in Kentucky, Tennessee and Indiana during 1945, which was found to be primarily due to male sterility. Experimental work has revealed that male sterility occurs in crosses which involve the inbred 33–16, an old line developed in Indiana, in the female parentage of the single, three-way or double hybrid, and possibly also in hybrids receiving a cytoplasmic contribution from the inbred Ky27. It is possible that other lines also carry the character of cytoplasmically inherited male sterility. It was found that the male sterility also depends upon genes from the male parent, a minimum of two genes apparently being necessary; lines K63 and MO2RF probably carry both genes. In addition, the expression of male sterility was influenced by date of planting. In view of these results, it is suggested that lines 33–16 and Ky27 should only be used as pollen parents in making single crosses for double hybrids, and that tests on a field scale should be carried out before the commercial release of new hybrids.

2225. VIEITEZ CORTIZO, E. and
BLANCO, J. L. 633.15:581.331.2:575.42
Relaciones entre la condición genética del maíz y las características biométricas de su polen. (**Relations between the genetic condition of maize and the biometric characteristics of its pollen**).
An. Inst. Españ. Edafolog. Ecol. Fisiol. Veg. 1947 : **6**(3) : 589–602.

Significant differences are reported in the dimensions of the pollen grains of different inbred lines, hybrids and varieties of maize. The large size of the pollen of inbred lines is attributed to an increased frequency of favourable genes brought about by stringent selection.

2226. GRIFFING, B. 633.15:581.46:575–184:578.08
**Type of gene action determining number of lateral tassel branches in maize.**
Genetics 1948 : **33** : 107–08. (Abst.)

"Intra- and inter-allelic gene action as it affects numbers of lateral tassel branches in maize is estimated by comparing the results of a constant parent regression analysis with those of models having known gene relationships. Four test criteria are used in estimating gene action: (1) consideration of parental and $F_1$ means, (2) constant parent regression trends, (3) evaluation of relative amounts of additive and non-additive genetic variance by components of regression analysis of variance, and (4) correlation of deviations of constant parent regressions from the theoretically additive scheme. This technique based only on parental and hybrid values eliminates the difficult estimation of linkage effects necessary in an analysis involving genetically segregating populations. The data representing seven inbred lines of maize and all possible $F_1$ combinations best fit an epistatic gene model with little or no dominance". [Author's Summary].

2227. BURDICK, A. B. 633.15:581.48:575–184
**Genetical and morphological relations of kernel-row number in maize (*Zea mays* L.) I. Nature of inheritance.**
Genetics 1948 : **33** : 99–100. (Abst.)

Studies on the inheritance of kernel row number in crosses between four- and eight-rowed inbred lines of maize have indicated that in the uppermost ear in the $F_1$ plants the eight-rowed condition is dominant, but that when the row number is determined for each potential ear on the plant the kernel row number decreases basipetally. Some evidence has been obtained suggesting that two major complementary genes determine the production of four- and eight-rows in the main ears.

2228. SPOONER, H. A. 633.15:581.6:575.12(74.6)

**New corn with high sugar content showing promise.**

Sth. Seedsman 1948 : **11** : No. 4 : 52, 62.

Sweet dent ensilage varieties of maize have been developed at the Connecticut Agricultural Experiment Station, which have outyielded other hybrids used for ensilage. The highest yielding commercial hybrid [(C 103 x Ohio 40B) x C 95] has produced 4·35 tons of dry matter and 32 bushels of grain per acre; the standard ensilage variety U.S. 13 yielded 3·66 tons of dry matter and 52 bushels of grain per acre. Several sweet dent hybrids for ensilage are now in commercial production. The hybrids are 75% dent and 25% sweet corn in origin. Their stalks and ears are considerably larger than those of ordinary ensilage hybrids; the stalks are unusually strong and resistant to breaking. An inbred of field maize, C 103, has recently been found which has an exceptionally high sucrose content in the stalks; an attempt is to be made to incorporate this characteristic in sweet dent hybrids.

Seed of the pole snap bean variety Mild White Giant is available (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1445).

2229. 633.15–1.557:581.483:575

KIESSELBACH, T. A. 633.15:581.483:581.13

**Endosperm type as a physiologic factor in corn yields.**

J. Amer. Soc. Agron. 1948 : **40** : 216-36.

Investigations were carried out at the Nebraska Agricultural Experiment Station to study the extent to which endosperm type in maize affects grain yield, since it has been generally observed that maize with either sweet or waxy endosperm has potentially lower yielding capacity than maize with starchy endosperm. Experiments have been carried out along the following lines: (1) determination of the immediate effects of outcrossing sweet corn and waxy hybrid maize by starchy or dent hybrid maize upon the acre yields of grain, stover (stalks and leaves) and fodder (total plant), and on the stover-grain ratio; (2) comparison of the grain yields of waxy hybrids and standard corn belt hybrids of the starchy type, isogenic except for the factor determining endosperm type; (3) analysis of the effect of preventing grain formation, by removal of the ear shoot at the time of silking, upon fodder yield and root development; and (4) study of the effect of semi-defoliation upon fodder yield.

When fertilized by pollen from starchy plants, the yields of grain per acre (calculated on a basis of 15% moisture content) of sugary and waxy maize increased 21% and 3·3% respectively.

The outcrossed sweet corn in the same experiment showed 14% increase in total plant or fodder yield, 9% increase in stover and 10 % decrease in the stover-grain ratio, compared with pure sweet corn, the stover and fodder yields being calculated on the basis of 15% moisture content as in the case of grain yield. The outcrossed waxy maize yielded 0·7% more fodder, 2·6% less stover, and showed 6% reduction in the stover-grain ratio, in comparison with pure waxy maize.

The feed constituents of the grain, stover and fodder of pure and outcrossed sweet corn and waxy maize were also analysed.

In the second experiment the standard starchy hybrids, Iowa 939, Iowa 306 and U.S. 13 gave lower grain yields in comparison with the corresponding waxy hybrids, Iowa x 1, Iowa x 2 and U.S. 13 waxy.

Removal of the ear shoots from plants in the third experiment brought about 27% decrease in total plant yield and 59% increase in the stover yield. This suggests that prevention of grain development results in considerably greater storage of photosynthesized products within the stalk and leaves, but materially reduces the total net photosynthetic output; chemical analysis confirmed this view. It was also found that the prevention of grain development did not bring about a proportionate substitution of the roots for the ear as a storage organ.

As a result of 50% reduction in the leaf area of plants studied in the fourth experiment, the synthesis of dry matter became 56% more efficient per unit of leaf area.

The following hypothesis is suggested in view of the results of the four experiments. Carbon accumulation is influenced inversely by the concentration of water-soluble photosynthesized products within the vegetative parts of the plant, the latter being modified in turn by the amount of translocation to the grain. Genetically controlled enzymatic relationships in the developing grain which are conducive to an intensified rate of translocation either indirectly accelerate photosynthesis in the leaves or reduce loss by respiration, so that the yield of total dry matter is increased as well as the grain yield. Less efficient translocation, however, whether due to failure of grain development or the genetically determined enzyme system, results in a higher concentration of water-soluble carbohydrates within the vegetative organs, reducing the capacity for carbon accumulation and crop yielding capacity.

2230. PATCH, L. H. and 633.15–2.7–1.521.6:575.12(73)
EVERLY, R. T. 633.15–2.7–1.521.6:575.115(73)
**Contribution of inbred lines to the resistance of hybrid dent corn to larvae of the early summer generation of the European corn borer.**
J. Agric. Res. 1948 : **76** : 257–63.

Experiments were carried out to compare the quantitative effects of inbred lines in single crosses as regards resistance to larvae of the European corn borer with their quantitative effects in double crosses. The inbred lines used had been previously classed as resistant, partially resistant or susceptible to larval attack. Each plant was infected by hand with about 80 eggs. The number of borers per plant increased by geometrical progression from a low population of borers in single or double crosses involving resistant inbreds to higher populations on single and double crosses consisting of more susceptible combinations. On the basis of the progressions, it was found that there were 38·3% as many borers in the resistant as in the susceptible single cross combinations, and 25·7% as many in the resistant as in susceptible double crosses.

Complementary or modifying factors were not found to play an important part in resistance to borer.

2231. MILES, S. R. 633.15.00.14:575.12(77.2)
**Performance of corn hybrids in Indiana. 1937-1946.**
Bull. Ind. Agric. Exp. Sta. 1948 : No. 526 : Pp. 76.

A detailed report is given of trials of maize hybrids at several locations in Indiana during the period 1937-46.

2232. CLAPP, A. L.,
TATUM, L. A. and
VANDEVENTER, W. 633.15.00.14:575.12(78.1)
**Kansas corn tests, 1947.**
Bull. Kans. Agric. Exp. Sta. 1948 : No. 336 : Pp. 39.

A report is given of the results of tests on maize hybrids and varieties carried out during 1947 in different districts of Kansas. Information is given of acre yield, stand, moisture content and other characters. The bulletin also summarizes the results of tests conducted during the past six years.

## BARLEY 633.16

2233. 633.16:575.243:581.04
GUSTAFSSON, Å. and 633.16:575.243:539.185.9
MAC KEY, J. 633.16:575.243:537.531
**The genetical effects of mustard gas substances and neutrons.**
Hereditas, Lund 1948 : **34** : 371–86.

An account is given of an investigation of the mutagenic effects, on barley, of nitrogen mustard and of neutrons as compared with the results of X-ray treatment. The dormant seeds were treated, and the first and second generations of plants arising from them were studied. Viable mutations including fertility changes and chlorophyll mutations of five types were taken into account.

It was found that, in mutagenic effect, treatment for 40 minutes with a 0·01% solution of nitrogen mustard corresponds approximately to irradiation with 1200 r units. Nitrogen mustard usually produces chlorophyll mutations of the *viridis* type and very rarely of the *albina* type; production of mutations by this agent appears from statistical analysis of the data to be non-random. The authors are in disagreement with Darlington and Koller (cf. Abst. 688) and maintain that the mutagenic actions of mustard gas and X-rays are distinctly different.

The actions of neutrons and of X-rays also appear to be distinct. The reasons for this are considered. Neutrons cause the production of chimaeras in the first generation in barley, many of the plants bearing longitudinal yellow or white stripes, a phenomenon very infrequent in X-ray experiments. Moreover, the effects of the two agents on plant survival and fertility are quite different, apparently because of the differences in ion density involved in the two kinds of treatment.

It is concluded that both mustard gas substances and neutrons may be advantageously used for producing mutations in agricultural plants.

2234. VINES, A. 633.16:581.142

**Studies on the germination of barley grains.**

Aust. J. Exp. Biol. Med. Sci. 1947 : **25** : 119–26.

In germination experiments at the Waite Agricultural Research Institute, University of Adelaide, the following barley varieties were tested: Algerian, Cape, Excelsior, Gopal, Hannchen, Kwan, Odessa, Prior, Research and Trebi. The heads were harvested at three stages of maturity, viz. soft dough, hard dough and the stage of maturity at which the lower kernels of each ear could be indented with the thumb-nail only with difficulty. When tested immediately after harvesting at the mature stage, all varieties showed some degree of delayed germination. Varietal differences in dormancy were observed. The varieties Algerian, Cape, Kwan, Prior and Trebi were classed as dormant, Gopal as moderately dormant and remaining varieties as non-dormant but still in the later stages of ripening. In most cases harvesting at the soft or hard dough stages was found to increase the length of the after-ripening period. The data obtained support the view that the developing grain is able to germinate when very immature but with progressive ripening it enters the dormant stage, after which germination increases with the process of after-ripening until normal germination is reached and the seed is fully mature. The removal of the hulls from immature seeds of the varieties Excelsior and Gopal, which are hull-less when mature, greatly increased their germination percentage.

2235. KIZIMA, P. N. 633.16:581.6(47)

**(The macaroni quality of barley).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 48–54.

Experiments have shown that it is possible to prepare macaroni from barley flour, though it is in almost every respect inferior to the macaroni made from wheat. Differences due to conditions of environment were more pronounced than varietal differences, though the variety Persicum 64 was easily the worst and Viner, Europeum 353/133, Onohoe, Verhnjačka 8 and Nutans 27 were among the best. Admixture of wheat or rye flour gave a higher quality product, which was still further improved by the addition of flour from some legume such as pea or *Lathyrus*.

2236. 633.16:581.6:575(42)

**Plant breeding progress at Cambridge.**

J. Inst. Brew. 1948 : **45** : p. 2.

A note is given on the breeding of malting barleys at the Plant Breeding Institute, Cambridge, referring to Earl (cf. Abst. 2161), selections of high malting quality obtained from crosses of short-strawed Danish varieties with English barleys which should be useful for combine harvesting, Pioneer (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 39) and Prefect (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 456).

2237. 633.16:581.6:575(42)
633.16.00.14(42)
633.79:575(42)

**Annual Report of the Council of the Institute of Brewing for the year ended 31st December, 1947.**
J. Inst. Brew. 1948 : **54** : 57–87.

The section on research includes reports of the following investigations:

*National Institute of Agricultural Botany, Cambridge.*

In the trials of winter barley, a new six-rowed variety (No. 55/2/1) from the Cambridge Plant Breeding Institute was tested against Prefect, and found to be markedly earlier in ripening. The spring sown plots included the Scandinavian varieties Kenia, Freja, Balder, Ymer, Abed Rigel, Lenta, Carlsburg and Alfa; and Spratt-Archer, Plumage-Archer 1943, Earl and three early ripening short-straw varieties bred at the Plant Breeding Institute.

The variety Earl is a selection of Spratt-Archer; in general field characters it closely resembles its parent, but ripens several days earlier (cf. Abst. 2161).

*Hops Research Institute, Wye College.*

This Institute was inaugurated in April 1947 (cf. Abst. 1111). Samples of Golding have been analysed with a view to selecting the best plants as parents for clonal races. Crosses have been made with the Fuggle and a Canadian male hop and with "open" flowers of certain selected parents. Plots of 48 new varieties were picked separately for brewing tests. Samples of 50 new varieties which are being tested at East Malling were analysed and arrangements made for brewing trials. Samples of commercial varieties from East Malling were also analysed.

"The 30th Report on the Trials of New Varieties of Hops for 1946" has already been published (cf. Abst. 1116).

*East Malling Research Station.*

Detailed records on seven clonal Golding selections have been maintained. Selection of Fuggles is being carried out. Propagation trials are reported. Further data on the amount of pull required to detach the cones of the chief varieties have been obtained. Trials of the resistance of Wye seedlings to *Verticillium* wilt were continued. Breeding for resistance was also carried out.

A fuller account of these and other investigations in progress at East Malling has previously appeared (cf. Abst. 611).

2238. Hunter, H. 633.16:581.6:581.02(42)

**The influence of environment on the yield and quality of certain varieties of malting barley.**
J. Inst. Brew. 1948 : **45** : 26–35.

The influence of environmental factors in the British Isles on the yield and quality of various malting barleys is analysed.

2239. Ruge, U. 633.16–1.547.6:581.04:581.143.26

Versuche zur Beeinflussung der Nachreife der Sommergerste. (**Experiments on influencing the post-harvest ripening of summer barley).**
Züchter 1946 : **17/18** : 59–62.

Barley grain stored at room temperature takes three months to attain its maximum germination capacity. Using a very early ripening summer barley Morgenrot, obtained from the Norddeutsche Saatzucht K.-G. [North German Seed Breeding Co.] on Rügen, it was found that natural unaided post-harvest ripening has a greater effect on the rate of germination than on the germination capacity. Exposure of the grain to low temperatures, e.g., + 5° C. for 3–8 days, accelerated post-harvest ripening, provided that the caryopses had first been caused to swell in water; without this preliminary swelling, cold treatment reduced the percentage of germinating seeds in the fully matured grain.

By treating the grain of Morgenrot directly after harvesting with an aqueous solution containing 2% of manganese sulphate and 1% of magnesium sulphate and then storing for 3–8 days at a low temperature, the full germination capacity was found to have developed.

This simple method is suitable for use in farming and by its application a new sowing of the summer barley Morgenrot in the autumn of the same year could at least provide green fodder in sufficient quantity to be worth producing.

The effects on maturation of other substances, e.g. permanganate and cyanide of potassium, and uranyl acetate, were tested, but only the oxidizing agents accelerated the process; short wave irradiation of seeds produced no marked increase in the percentage which germinated later. E. W.

2240. 633.16–2.452:576.16:631.521.6:575.11

STRAIB, W. 633.16:575.115

Über die Vererbung des Verhaltens der Gerste gegenüber Gelbrost. **(On the inheritance of the behaviour of barley towards yellow rust).**

Züchter 1940 : **12** : 115–20.

Eleven hybrids of barley were tested with regard to inheritance of behaviour towards races 23, 24 and 46 of *Puccinia glumarum* var. *Hordei*, and race 2 of *P. glumarum* var. *Tritici*; race 46 had the same effect on the parent barley varieties as race 23, and race 2 fructified only on the Fong Tien white barley, *Hordeum tetrastichum* var. *pallidum* No. 2811. As regards *P. glumarum* var. *Hordei*, the immunity of a naked 2-rowed barley (*Hordeum distichum* var. *nudum*) No. 2895 was dominant to different degrees of susceptibility, as was also the high resistance of Heils Franken (*Hordeum distichum* var. *nutans*) No. 2834 to higher degrees of susceptibility. The resistance to races 23 and 24 of a 4-rowed barley (*Hordeum tetrastichum* var. *pallidum*) No. 2890 was recessive or intermediate, whereas the same degree of resistance which it showed to *P. glumarum* var. *Tritici* was a dominant character.

The factors involved in resistance were analysed in the $F_3$ from the following crosses: Heils Franken x Criewener 405, Heils Franken x *Hordeum distichum* var. *nudum* and Bavaria x Bethges III. Monofactorial segregation was found to occur when the highly resistant Heils Franken was combined with the susceptible Criewener 405, race 23 being the infecting yellow rust. The resistance of Heils Franken to races 23 and 46 is determined by one and the same factor, and though dominant to susceptibility, is recessive to immunity. The resistance of the variety Bavaria to race 23 is due to at least two recessive factors which also cause the resistance of this variety to race 46. In none of the crosses did transgression as a result of polymery occur. E. W.

2241. HANSEN, J. 633.16.00.14(48.9)

Forsøg med Sorter af toradet Byg 1931–1946. **(Experiments with varieties of two-rowed barley 1931-46).**

Tidsskr. Planteavl 1945 : **51** : 480–99.

The results are given of four series of variety trials of two-rowed barley at eight to nine centres throughout Denmark; the first three series were carried out during the period 1931–42 and the fourth in 1943–46.

In the first three series Abed Maja gave the highest grain yield. In the fourth series the same variety outyielded all the others, except Svalöf Ymer [(Svalöf Sejr x Abed Opal) x Abed Maja] and Lenta (Abed Maja x Abed Kenia), which were only included in 1945 and 1946 and in these years gave slightly more grain than Maja. Svalöf Freja (Sejr x Opal) was the earliest variety and Abed Rigel (Abed Kenia x Maja) was the most resistant to lodging in the fourth series. Other new varieties included in the fourth series were Øtofte L 64 and Alfa (both selections from Kenia), Weibull's Balder [(Svalöf Guld x land race) x Maja], and K.V.A.L., a selection by the Royal Veterinary and Agricultural School, Copenhagen. Data are given on yield and quality of grain, yield, strength and length of straw and on average date of maturity for all varieties. H. L. P.

## MILLETS AND SORGHUM 633.17

2242. QUINBY, J. R. and 633.174:575.113.4"793"

KARPER, R. E. 633.174:575.12

**The effect of different alleles on the growth of sorghum hybrids.**

J. Amer. Soc. Agron. 1948 : **40** : 255–59.

Tall stature of plant and lateness of maturity in sorghum varieties depend upon complementary gene action affecting the elongation of the internodes and time of floral initiation, the increased growth and production of most $F_1$ intervarietal hybrids being due to a combination of complementary gene action and heterosis in the true sense; heterosis proper is shown in increased tillering and large plants that grow in an equal or shorter period than the parental varieties. The following pairs of varieties each differ in an allele affecting time of maturity, as indicated: Texas Milo *Ma*, Sooner Milo, *ma*; Hegari, *Ma*, Early Hegari, $Ma^e$; and Kalo, $ma_4$, Early Kalo, $Ma_4$.

$F_1$ plants of the following pairs of crosses were studied for height, duration of growth, tillering, and yield of grain and stover: Texas Blackhull Kafir crossed with Early Hegari and Hegari; Texas Blackhull Kafir crossed with Kalo and Early Kalo; Texas Blackhull Kafir crossed with Texas Milo and Sooner Milo; Early Hegari crossed with Texas Milo and Sooner Milo; Hegari crossed with Texas Milo and Sooner Milo; Hegari x Texas Milo and Early Hegari x Texas Milo.

In all cases the parents are dwarf in stature since they are recessive for two genes that cause a shortening of the internodes. Texas Blackhull Kafir, Kalo and Early Kalo are identical in genes for height, but the varieties Hegari, Early Hegari, Texas Milo and Sooner Milo differ in at least one gene for height. As a result of complementary action, all the $F_1$ plants were tall, except the Kafir x Kalo and Kafir x Early Kalo hybrids.

The various crosses showed different dates of maturity depending upon the complementary action between the alleles for lateness of maturity contributed by the parents; thus, for example, complementary action between *Ma* and $Ma_2$ or $Ma_3$, or both, accounts for the extreme lateness of the Kafir x Texas Milo, Kafir x Hegari and Kafir x Early Hegari $F_1$ hybrids.

All the hybrids exceeded the parents in yield of grain and stover. A positive correlation between duration of growth with number of leaves and height was obtained. Duration of growth was found to be positively correlated with stover production, but, in cases of similar durations of growth, it was negatively correlated with grain production. The alleles differentiating the Milo, Hegari and Kalo varietal pairs were found to differ in combining ability, as shown by differences in the yield of grain produced. $F_1$ hybrids differing by only one allele and which have similar duration of growth produced grain yields differing by 25% or more.

2243. GARBER, E. D. 633.174:576.356.2:537.531.:581.162.5

**A reciprocal translocation in *Sorghum versicolor* Anderss.**

Amer. J. Bot. 1948 : **35** : 295–97.

An X-ray induced reciprocal translocation of the *Zea* type in *S. versicolor* ($2n = 10$) is reported. Plants with pollen grain abortion had a ring of four chromosomes, showing that they were heterozygous for the interchange, which involved the nucleolar chromosome and one of the other chromosomes.

The progeny of a plant carrying a ring were also examined cytologically. Twenty-seven of the 49 plants tested were semi-sterile and had the ring of four plus three bivalents, while the remaining 22 plants produced normal pollen and had only bivalents.

Data on the fertility of the different plants are given.

A study of the quartets of semi-sterile plants heterozygous for the interchange showed that 50% of the spores were normal ones derived from pollen mother cells with a zigzag configuration of the interchange chromosomes. Of the other 50%, 23·2% came from pollen mother cells with a type of open ring configuration in which non-disjunction of the nucleolar chromosomes occurred and 26·8% from those with another kind of open ring configuration.

2244. SKOROHODOV, P. I. 633.174:581.162.035(23)

**(Floral biology of millet).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 62–63.

In high mountain zones the whole course of floral development is much slower than normal and each stamen has to be removed separately, just as it begins to turn yellow, when emasculating the florets for hybridization. Crossing can be effected naturally by growing plants of the pollen parent in proximity to the emasculated plants.

2245. Watkins, J. M. 633.174–1.524(8)
**Sorghums serve Salvadorans for food and for feed.**
Foreign Agric. U.S. Dep. Agric. 1948 : **12** : 71–73.

The cultivation and uses of sorghum in El Salvador are described. The "native" variety is a tall growing type with hard white seed; it takes five to six months to mature. Sorghum improvement is being given considerable attention by the Centro Nacional de Agronomía [National Agronomy Centre]. Introduced varieties are being tested in various parts of the Republic. Early Hegari, Early Kalo and Shallu and several other introductions appear to be promising in certain respects. The introduced varieties have the important advantage of earlier maturity, so that more than one harvest can be obtained in a single year. Suitable introduced varieties would be valuable in the short rotational system used in El Salvador. The need for further testing of imported varieties is stressed, and it is suggested that the native variety might be used advantageously in crosses with the most suitable introduced sorghums, to breed improved varieties for the Republic. The native variety has the disadvantage of late maturity, but on the other hand its seeds are hard and appear to be less susceptible to insect attack.

Up to the present the grain types have received most attention, but it is thought that the sweet types will play an important part in silage production.

2246. Dahms, R. G. 633.174–2.7–1.521.6
**Effect of different varieties and ages of sorghum on the biology of the chinch bug.**
J. Agric. Res. 1948 : **76** : 271–88.

Differences in varietal susceptibility of sorghum to chinch bug (*Blissus leucopterus*) are reported, as the result of previous investigations (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1201). In general, the milo sorghums are very susceptible under field conditions, the feteritas susceptible, and kafir and sorgo varieties fairly resistant.

The following investigations at the Oklahoma Agricultural Experiment Station are described: laboratory experiments on the effect of variety on oviposition, longevity of the female insects, size of adults, rate of nymphal development, mortality of nymphs, host preference and host tolerance; and field experiments on the effect of variety and age of the plant on oviposition, longevity, size of adults, rate of nymphal development, and nymph mortality. Differences were observed in the biology of the chinch bug when feeding on different varieties and plants of different ages. These differences are attributed to the condition or composition of the cell sap rather than to any observable morphological characters of the plant.

## RICE 633.18

2247. Piacco, R. 633.18(45)
Studio comparato delle principali varietà di riso coltivate in Italia.
(**Comparative study of the principal rice varieties grown in Italy**).
Risicoltura 1948 : **36** : 27–33, 60–64, 91–95, 107–112, 135–39, 151–55.

In continuation of previous studies (cf. Abst. 1615) data are given regarding the period from sowing to flowering and to grain maturity and the effect on these of varying delays in date of sowing. As regards height of plant, Vialone was the tallest variety and Ardito the shortest under normal conditions of sowing; the relationship between the varieties altered somewhat in late sowings, especially as early and late varieties reacted differently. Tillering capacity was greatest in Marchetti (13·6 stems per plant) and lowest in Variety 15 (6·5). The degree of emergence of the panicle above the leaf sheath varied in different varieties. All varieties were awnless except Vialone and Strain 136, which have short, soft, smooth rudimentary awns, and Allorio, Agostano and Sesia, which in certain samples show a tendency towards a semi-awned type. The length of glume and of grain is given for the different varieties; also the out-turn of refined grain, hectolitre weight, germination percentage and plant colour.

Full descriptions are given of the individual varieties, arranged in alphabetical order.

2248. Gunawardena, K. J. 633.18(54.5)
**Botanical characters of paddy.**
Trop. Agriculturist 1947 : **103** : 105–12.

The botanical characters of the following rice selections are given: 2462/11 Pachchaiperumal, 38 YM 2208 Sinnanayan, 26014 Perillanel, a–8 Podiwi, Hf–9 Suduheenati, 28061 Vellai illankalayan, 2449/20 Oddovalan, b–13 Kurulutuduwi, 26081 Dewareddiri, 1 Cpy–19 Suduheenati, B–11 Mawi, 37 YM 2014 Dahanala, 38 YM 3753 Rathkarayal, 38 MY 137 Madael and 39 YM 3254 Kaluheenati.

2249. 633.18:575(45)
Attenzione alla varietà "Ardito". (**Beware with the variety Ardito**).
Risicoltura 1947 : **35** : p. 177.

A great number of grains of the rice variety Ardito have recently developed a red pericarp, which gives the caryopsis a muddy appearance instead of the straw yellow of the original form. Such red grains can best be distinguished when the ears are wet after rain and in cases of doubt selection should be carried out at that time.

2250. 633.18:575(45)
Relazione sul Concorso selezione sementi riso 1947. (**Report on the 1947 rice seed selection competition**).
Risicoltura 1948 : **36** : 78–90.

A number of prizes were awarded to the best of the 370 competitors in the 1947 rice competitions organized by the Vercelli rice research station. Americano 1600 remained the most popular variety, immediately followed by Race 77 and Rinaldo Bersani (a selection from Sesia). A number of other varieties were represented in smaller proportions.

2251. Chiappelli, R. 633.18:575(45)
Prove di orientamento di nuove varietà di riso. (**Preliminary tests of new rice varieties**).
Risicoltura 1947 : **35** : 32–35.

The rice varieties Adelaide Chiappelli and Senatore Novelli (cf. Abst. 1614) have given excellent results and ripen 8–10 days earlier than Americano 1600. Both varieties have exceptionally large grains, those of Adelaide Chiappelli being larger than any other variety known, with a 1000 grain weight of 48 grm. This variety yielded up to 62 quintals per ha. on quite mediocre soils in 1946 and Senatore Novelli yielded 65 quintals. The author's other variety, Sesia (cf. Abst. 1611) yielded up to 80 quintals on good soil. All three are resistant to lodging and to brusone and are recommended for replacing Maratelli and Allorio.

2252. Chiappelli, R. 633.18:575(45)
Le nuove varietà di riso create dal Dott. Chiappelli nel guidizio di un valente agricoltore. (**The new rice varieties bred by Dr. Chiappelli in the opinion of a sound farmer**).
Risicoltura 1948 : **36** : 50–51.

Strain 136 (cf. Abst. 953) has been well received by the growers and has maintained its high yield and resistance to diseases and lodging; it is earlier than Americano 1600 and somewhat better in both yield and quality. Its grain is very firmly attached and suffers less damage both from hail and birds than most other varieties.

Family 32 resembles Strain 136 in most respects but has a higher tillering capacity.

2253. Chiappelli, R. 633.18:575(45)
La selezione del riso. (**Rice selection**).
Risicoltura 1948 : **36** : 149–50.

The prizes offered this year by the Stazione Sperimentale di Risicoltura [Rice Research Station] in Italy include five gold medals for competitors who create new varieties of genetical importance.

2254. CHIAPPELLI, R. 633.18:575(45)
La selezione del riso. **(Rice selection).**
Risicoltura 1947 : **35** : 160–64.

CHIAPPELLI, R.
La selezione del riso nell'azienda. **(Rice selection on the farm).**
Ibid. 1947 : **35** : 175–76.

Indications are given of the type of ground suitable for carrying out rice selection work, of how to recognize and remove wild rices, cultivated varieties with red grain and plants showing other aberrant characters. The operation of mass selection is then described for the benefit of cultivators wishing to take part in the Italian national rice competitions, and examples are named of famous varieties that have originated in that way.

2255. PIACCO, R. 633.18:575(45)
La razza "Americano 1600". **(The variety Americano 1600).**
Risicoltura 1947 : **35** : 26–31, 51–58, 70–76, 118–22, 137–41, 155–59, 181–83, 201–02, 245–50 : **36** : 19–22.

A brief historical account is given of the rice varieties cultivated in Italy. The variety Chinese Originario was produced by a cultivator who had grown some seeds of an introduction from Japan, most of which failed to mature. Certain plants were however smaller and more vigorous that the rest and their grain ripened. The new variety was so popular that it quickly displaced all others; it was introduced into the U.S.A. and received the number 1600, and in California the name Colusa. Seed of the American form was reimported into Italy in 1920 and given the name Americano 1600, and some years later again under the name Californiano. The variety still accounts for three quarters of the rice cultivated in Italy, and a full description, with illustrations, is given of its characteristics. The descriptions include a full account of the floral biology and the anatomy of the caryopsis, data regarding the sum of mean daily temperatures required by the variety to attain maturity in different countries, and the most appropriate methods of cultivation. The variety is relatively resistant to shedding and low temperature but only moderately resistant to lodging; it is well adapted to cultivation under unfavourable conditions, but under good conditions produces yields of up to 100 quintals per ha.

2256. PIACCO, R. 633.18:575(45)
Una nuova varietà di riso. **(A new rice variety).**
Risicoltura 1948 : **36** : 9–11.

There are some 30 rice varieties in cultivation in Italy at the present time, but each is defective in one or more respects. The defects of the main varieties are indicated. Breeding work continued at the rice research station at Vercelli even during the war, and several new varieties produced during this time are now undergoing comparative tests. One of them, a hybrid of P.6 x Americano 1600, is mid-early, maturing some ten days before Americano 1600, which it excels in size of grain, with a thousand corn weight of 34 grm. It is adapted to a wide range of cultural conditions, and is satisfactory in yield and standing capacity. It is regarded as a promising substitute for the variety Maratelli.

2257. 633.18:575(47)
633.18:575"793"(47)
633.18–2.111–1.521.6:575(47)
**New varieties of rice in Soviet Central Asia.**
Soviet News 1948 : No. 1971 : p. 4.

A note is given on new rice varieties developed in the Central Asiatic Republics. These include frost resistant varieties which can be sown early and harvested in July, and a variety ripening in 75 to 80 days. It is mentioned that in Uzbekistan investigations are being carried out on 2500 varieties from various parts of the world and on a large number of hybrids.

2258. 633.18:575(54)
633.523:575(54)
BOSE, D. M. 633.51:575(54)
**Nature of research work undertaken in the Bose Institute.**
Proc. Nat. Inst. Sci. India 1944 : **10** : p. 93.

Investigations connected with the cultivation of rice, jute and cotton in progress at the

Bose Institute are stated to include work on the introduction of new varieties, selection, hybridization and the production of new mutants by treatment with X-rays and other agents.

2259. 633.18:575.42(92)
633.18:575.12(92)
Giessen, C. van der
Rijstvariëteiten en rijstselectie op Java en Madoera. **(Rice varieties and selection of Java and Madura).**
Landbouw 1947 : **19** : 309–12.

The varieties cultivated in these islands fall into two groups: those with and those without awns. The former group in fact includes some awnless varieties which are shown to belong there by other characters. Varieties with awns in general produce good grain, tiller less, and resist lodging more than the awnless varieties, but they are less resistant to diseases, pests and unfavourable conditions. They are generally grown on fertile, well irrigated "sawahs". Awned varieties cross naturally more readily with both awned and awnless varieties than do the awnless; they give an especially high percentage of hybrids when grown next to awnless varieties.

Three methods of selection are employed. (1) A large number of local and foreign varieties are grown for several years at the various selection gardens and are examined for high yield, good quality, lodging and resistance to diseases and pests, especially "mentek". Those found satisfactory are subjected to variety trials included in a variety list and ultimately multiplied for large scale use. (2) Line selection is applied to non-uniform varieties; the pure lines are then tested as in (1). This method is also applied to degenerated varieties. In this manner line 277 has been selected which reproduces completely the original variety Brondol Poetik. Another line T43 selected from this variety combines high yield and resistance to "mentek", but it is very liable to lodge. (3) Hybrid selection has been applied on a large scale only during the last eight to ten years. Two parent varieties are planted side by side. The resulting hybrid seed is grown for three to six generations, each time planting seed from the last harvest usually without any selection. Line selection is then applied.

Original seed of 27 varieties is now provided by the Cultuurtechnisch Instituut [Institute of Plant Industry] for planting and a descriptive list of such varieties is issued annually.

2260. Tu, D. S. and
Kuang, H. H. 633.18:581.162.5:575.12(51)
**(Studies on the fertility of rice hybrids in varietal crosses).**
J. Agric. Ass. China 1947 : No. 185 : 8–10.

Average fertility of $F_1$ hybrids between different types of rice is 9·34%, and between varieties of a given type 77·4%. The study of the vars *indica* and *japonica* has, however, indicated that fertility is not necessarily a reliable criterion in distinguishing the two types. Average percentages of abortive pollen grains in the three crosses studied are given as follows: early non-glutinous *indica* type x late glutinous *japonica* type, 58·70 ± 4·74; early non-glutinous *indica* type x late non-glutinous *japonica* rice, 52·87 ± 6·39; late non-glutinous *japonica* rice x late glutinous *japonica* rice, 6·28 ± 1·07. A correlation of 0·893 ± 10 between fertility and pollen abortion was obtained for the $F_1$ generations. Fertility in the hybrids was found to vary with date of heading. At any early date, the environmental factors are conducive to a relatively higher degree of fertility; at a late date of heading the environmental conditions tend to reduce blossoming and fertility. The character of fertility appeared to be genetically independent of endosperm type, awns, the colour of the leaf sheath, colour of the apiculus or hull colour in certain of the crosses, but in other cases it appeared to be associated with the awned character, colour of the apiculus and colour of the empty glume. No further information on the genetics of fertility is available.

2261. Tang, W. T. and
Hwang, C. H. 633.18:581.192
**(Regional and varietal difference of discoloration of the husked rice extract treated with methylene blue).**
Tech. Bull. Taiwan Agric. Res. Inst. 1947 : No. 5 : Pp. 19.

Samples of 806 rice varieties were milled and extracted with distilled water, and 20 cc. of each extract were treated with 2 cc. of 0·1% methylene blue solution. The discoloration was graded into seven categories. The discoloration produced in extracts from varieties of Japan proper and of Horai was more marked than that produced in extracts of the local Formosa varieties, and varieties from China and tropical Asia.

It is stated that the cultivated varieties of rice can be classified into two main groups, those producing discoloured extracts with methylene blue and those producing non-discoloured extracts. Varieties from the colder northern regions are said to belong to the former group, and those from the warm southern regions to the latter. Upland rice and glutinous varieties are more liable to give discoloured extracts than the lowland and non-glutinous. Differences of discoloration appeared to be associated with different amounts of amylase in the seed.

2262. PIACCO, R. 633.18:581.48:578.088(45)
Principali caratteristiche delle cariossidi nelle varietà italiane di riso. **(Principal characteristics of the caryopses of the Italian rice varieties).**
Risicoltura 1947 : **35** : 6–9.

Tabular data are given for length, breadth and thickness of grain, ratio of length to breadth, 1000 grain weight, volume of 1000 grains and specific weight for the chief Italian rice varieties, with indications of those varieties that show extreme values, high or low.

2263. KOCZOR, F. 633.18:581.6(43.91)
Az 1942. és 1943. évi hazai termésű rizsek minőségi vizsgálata. **(Experiments made on the quality of Hungarian rices grown in 1942 and 1943).**
Rep. Hung. Agric. Exp. Sta. 1947 : **47–49** : 17–26.

About 90% of the rice grown during 1942 and 1943 in Hungary consisted of the variety Dunghan Shali; other varieties tested in this experiment were Árpa Shali, Varsányhelyi I and Ömirt. Data were obtained on the following: moisture content, specific gravity, 1000 grain weight, number of green grains, number of white grains, hardness of grains and number of red grains. No correlations are given. T. P. B.

## FORAGE GRASSES 633.2

2264. WHYTE, R. O. 633.2/3(56.9)
**The fodder resources of Palestine. A report of a survey made in autumn 1945 and spring 1946**
Palestine Government 1948 : Pp. 31.

The results of a survey of the present fodder and grazing resources of Palestine are presented, together with recommendations on possible methods of improving these resources in quality and quantity. Attention is drawn to the need for selection and multiplication of superior strains of fodder species adapted to the climate and systems of husbandry in Palestine.

2265. 633.2(79.4)
LOVE, R. M. 633.32(79.4)
**Eight new forage plants developed for California ranges.**
Calif. Agric. 1948 : **2** : No. 1 : 7, 14.

The following new grasses have been recently certified by the California Crop Improvement Association: nodding and purple stipa, the foundation seed of each of these native species being a blend of 12 superior strains selected at Davis; smilo; perennial veldt grass; Harlan brome, derived from material in the grass collection of the University of California, Berkeley, and presumably originally introduced from Chile; a strain of prairie brome, first grown in California at the Meloland Experiment Station, in the Imperial Valley, from seed introduced from New Zealand; and ryegrass 12, an introduction from New Zealand, and believed to be a sister strain of the short rotation grass developed in New Zealand by crossing annual and perennial ryegrass. Rose clover, a winter annual, has also been certified. The foundation was derived from F.C. 23104, and the original seed was obtained from the United States Department of Agriculture, Beltsville.

2266. 633.2:575(48.5)
633.32:575(48.5)
Åkerberg, E. and 633.2–2.111–1.521.6(48.5)
Wiklund, K. 633.32–2.111–1.521.6(48.5)
Betesväxter och betesvallfröblandningar för Norrland. 1. Resultat från försök med betesväxtstammar utförda vid Sveriges Utsädesförenings filialer i Norrland under åren 1932–1946. (**Varieties and seed mixtures for pastures in Norrland. 1. Results from pasture plant trials performed at the Norrland branch stations of the Swedish Seed Association in the years 1932-1946**).
Sverig. Utsädesfören. Tidskr. 1948 : **2** : 31–52.

This account of selection work and trials of strains of suitable pasture crops for Norrland is based mainly on results from the Västernorrland Branch Station. The methods and origin of the material used are described. Of the varieties of *Poa pratensis*, Skandia II, Fylking, Primo (Weibullsholm) and Gullåker [Yellow Field], the first did best in Norrland, showing rapid spring growth and high yield; Fylking is also valuable for its uniform growth during the season, though not equalling Skandia II in yield. Primo was also recommended.

American commercial seed was outyielded by highly bred Swedish strains.

Strains of *Festuca rubra* have been bred with greatly improved spreading capacity and without the limiting effect which this species often exerts on other plants in the pasture. The new strains appear to be more palatable for stock. Trials have shown Swedish strains to be superior to imported commercial varieties for Norrland. Viking seemed best, but Rex and Reptans were also good varieties of the creeping, less aggressive type.

The most hardy and high yielding of the perennial rye grasses is Viktoria but the Valinge strain from Södermanland, a central province of Sweden, over-wintered remarkably well in Lännäs (Norrland) and might also surpass Viktoria in yield.

The southern Swedish strains of *Poa palustris*, Primus and Hammenhög, seem faster growing than the indigenous Norrland K.V.B.A. No. 5 strains.

White clover showed similar differences of habit in northern and southern Swedish strains, the latter, if hardy enough, outyielding the former in first leys: in later leys, however, the position may be reversed owing to the superiority of the winter hardy Norrland types to the less persistent southern forms. Breeding by acclimatization has given good results, e.g. the increased hardiness and persistence of the Danish clover Morsö, after selection at Skultana. In southern Sweden such selection was, however, ineffective. A new white clover strain Å 69 with high yield and excellent persistence has been selected from a wild Norrland form.

2267. Felföldy, L. 633.2:576.356.5:576.16(43.91)
Néhány hazai fűfajta természetes polyploid alakja. (**Natural polyploid races of certain Hungarian grasses**).
Rep. Hung. Agric. Exp. Sta. 1947 : **47-49** : 11–16.

Chromosome counts were made on certain grasses found in the Tihany peninsula, Lake Balaton. Only those races are discussed in which new polyploid races were found. These are as follows: *Agrostis stolonifera* L., $2n = 28$; *A. gigantea* Roth., $2n = 42$; *Poa pratensis* L., $2n = 35, 42, 49$; *Festuca pseudovina* (Hack.) Nym., $2n = 28$; *F. valesiaca* Schleich., $2n = 28$; *F. sulcata* (Hack.) Nym., $2n = 42$, and its hybrid, $2n = 35$.

It is suggested that some of these races could be used for hybridization in breeding work. In particular, it is suggested that, as *F. sulcata* yields better than *F. pseudovina* and is more suitable for arid climates, it could be used for breeding. T. P. B.

2268. Müntzing, A. 633.21:576.356.4
**Accessory chromosomes in *Poa alpina*.**
Heredity 1948 : **2** : 49–61.

From two to eight accessory chromosomes, smaller than the 14 ordinary chromosomes, were found in the pollen mother cells of a strain of *P. alpina*. Usually there was an even number of them in the pollen mother cells and none in the root tip cells. Possibly this arrangement is due to somatic non-disjunction. The meiotic behaviour of the accessory chromosomes is described.

2269. 633.22:576.356.5:576.16
MYERS, W. M. 633.22:575.127.2
**Studies on the origin of *Dactylis glomerata* L.**
Genetics 1948 : **33** : p. 117. (Abst.).

The cytological and genetical behaviour of *D. glomerata* is of an autotetraploid nature. It has been postulated that this species originated by chromosome doubling of the diploid species *D. Aschersoniana*. Colchicine induced autotetraploids of the latter species resemble *D. glomerata* in cytological behaviour, and produce fertile $F_1$ hybrids when crossed with *D. glomerata*. The induced autotetraploids do not, however, exhibit the range of characters found in *D. glomerata*, and are distinguishable from the normal diploids only with difficulty. A diploid species of *Dactylis*, not yet identified, has been obtained from Iran. Plants of this diploid have densely pubescent glumes, short glomerate panicles, blue-green foliage and early maturity; as regards these characters, *D. glomerata* ranges between the extreme forms of this diploid and *D. Aschersoniana*. The diploid from Iran is cross-fertile with *D. Aschersoniana*; the $F_1$ plants produced from the cross are pollen fertile, produce an abundance of seed, and resemble a majority of normal plants of *D. glomerata* in size, date of maturity, and other characters in which *D. glomerata* differs from *D. Aschersoniana*.

2270. HILL, H. D. and
MYERS, W. M. 633.262:576.312.35:576.356.4
**Chromosome number in *Bromus inermis* Leyss.**
J. Amer. Soc. Agron. 1948 : **40** : 466–69.

Chromosome counts were carried out on the root tip cells of 193 plants of *B. inermis*, representing a wide range of morphological types of diverse origin. With one exception, the chromosome number was found to be $2n = 56$, or approximately 56. One plant, selected from Nebraska 10–3487, possessed from 8 to 11 accessory chromosome fragments in addition to the apparently normal chromosome complement of 56. It is suggested that these fragments may be analogous to the B chromosomes found in maize and other Gramineae.

2271. SMIRNOV, P. A. 633.264:582(47)
**(Taxonomy and distribution of the middle-Russian species of the group *Festuca ovina* L. *s. ampliss.*).**
Bjulletenj Moskovskogo Obščestva Ispytateleĭ Prirody (Bull. Soc. Nat. Moscou) 1945 : **50** : No. 1–2 : 89–103.

Latin descriptions are given of four species of the group *F. ovina* L. *s. ampliss.*, one of the species being new.

2272. BURTON, G. W. 633.266:575.12:578.08(75.8)
**Artificial fog facilitates *Paspalum* emasculation.**
J. Amer. Soc. Agron. 1948 : **40** : 281–82.

The flowers of *Paspalum* spp. have glumes which clasp each other so tightly that it is extremely difficult to open them before anthesis occurs, and emasculation several days before anthesis is impracticable. It is therefore necessary to emasculate the florets when the lemma and palea normally open at the time of anthesis, but this method may fail because pressure from the tweezers may crush the anthers and release the pollen. It has been found that under conditions of high humidity, produced by means of an automatic humidifier of the type used in tobacco warehouses, the anther walls are less likely to burst open. The technique has been used successfully in the emasculation of *Paspalum* for several years at the Coastal Plain Experiment Station, Tifton, Ga, and is recommended for other grasses difficult to emasculate. The humidifier has also been used to maintain the high humidity required for rooting green wood cuttings of certain horticultural plants.

2273. BURTON, G. W. 633.266:575.12:578.08(75.8)
**A method for producing chance crosses and polycrosses of Pensacola Bahia grass, *Paspalum notatum*.**
J. Amer. Soc. Agron. 1948 : **40** : 470–72.

Previous work has shown that the diploid Pensacola Bahia grass is highly self-sterile (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1281).

Panicles of Pensacola Bahia grass ready to flower will bloom and mature seed in water if a short piece of rooted stolon is left attached to the culm. This behaviour facilitates the production of chance single crosses and polycrosses.

Reciprocal chance crosses can be secured by placing the rooted culms of the two parents together in a separate glassine bag. If several crosses are to be made, a number of these crossing units can be placed in one container of water and held together with string or a rubber band. The cans are then placed in a cool, moderately light place in the laboratory, where they remain until the seeds mature. Good cross-pollination is ensured by shaking the bags each morning. To make polycrosses, the rooted culms of the chosen clones are placed together in a single bucket. The entire group of heads is shaken vigorously each morning until all the florets on the panicles have flowered. The culms are then left in the bucket until the seed is mature.

2274. 633.266:581.163

Burton, G. W. 633.266:581.162.51:575.12

**The method of reproduction in common Bahia grass, *Paspalum notatum*.**

J. Amer. Soc. Agron. 1948 : **40** : 443–52.

Common Bahia grass, a promising pasture grass for the south-eastern United States, showed no evidence of self-sterility when grown in isolation. Bagging panicles on isolated clones had an unfavourable effect upon seed setting; glassine and parchment bags reduced the seed set to a greater degree than cotton bags. Selfing for one generation did not bring about any reduction in vigour. Little, if any, natural crossing appears to occur in common Bahia grass, since no natural hybrids were obtained by interplanting plants with normal red stigmas and a plant with white stigmas.

A male-sterile plant occurred in the progeny of the individual with white stigmas. This male-sterile plant was increased clonally in the greenhouse, and occasional florets were observed with one or more functional anthers. The unusually vigorous condition of the plants with functional anthers suggested that the presence of such anthers may be associated with plant vigour. Soil fertility was found to exert some influence on the production of fertile anthers.

The male-sterile form set no seed unless pollinated. Pollen from various types of Bahia grass was effective for seed production.

Most of the seed obtained by pollinating the male-sterile form with pollen from common Bahia grass with red stigmas, and from the diploid Pensacola Bahia grass, gave rise to plants closely resembling the female parent. Red stigma and male fertility showed dominance over white stigma and male sterility in the very few hybrids secured. The hybrids between the male-sterile form and common Bahia grass with red stigmas had a chromosome number of $2n = 61$; the other plants obtained in the crossing, which resembled the female parent, had a chromosome number of $2n = 40$. The hybrids between the male-sterile form and Pensacola Bahia grass possessed a chromosome number of $2n = 50$. The hybrids from both crosses produced some open-pollinated seed. The $F_2$ progenies raised from this seed showed no evidence of segregation, every plant in each of the $F_2$ progenies resembling its $F_1$ parent. A hybrid obtained from the reciprocal of the cross common Bahia grass x Pensacola Bahia had a chromosome number of $2n = 30$. The data therefore suggest that common Bahia grass probably reproduces chiefly by apomixis or unreduced pseudogamy.

2275. 633.266:582(82)

Parodi, L. R. 633.285:582(82)

Gramíneas argentinas nuevas o críticas. (**New or critical Argentine grasses**).

Rev. Argent. Agron. 1948 : **15** : 53–61.

One new variety, *Paspalum notatum* var. *Saurae*, and two new species, *Stipa tucumana* and *Calamogrostis Cabrerae*, are described.

2276. FRANZKE, C. J. 633.282:581.192(78.3)
**Diurnal variations of hydrocyanic acid, dry matter, and total sugar in sorghum strains.**
J. Amer. Soc. Agron. 1948 : **40** : 396–406.

Experiments were carried out at the South Dakota Agricultural Experiment Station on the diurnal variations in the content of hydrocyanic acid, dry matter and sugar of five strains of the sorghum Dakota Amber. The strains showed different levels of hydrocyanic acid content and diurnal trends of variation in this property, which are attributed to genetic differences. The diurnal variation in hydrocyanic content was found to be associated with the diurnal variation in the sugar and dry matter contents, increases in sugar and dry matter being followed by a corresponding increase in hydrocyanic acid content. Environmental conditions and the state of growth were also found to influence the hydrocyanic acid content.

2277. MISRA, K. C. 633.282:581.481(54)
**Polyembryony in *Dichanthium annulatum*. Stapf.**
Curr. Sci. 1948 : **17** : p. 91.

Among approximately 1500 seeds of *D. annulàtum* germinated by various methods one triplet and about 12 twin seeds were found.

2278. KRISNASWAMY, N. and 633.283:576.356.5
RAMAN, V. S. 633.283:576.312.35
**Polyploidy in *Pennisetum purpureum* Schumach—the dry Napier.**
Curr. Sci. 1948 : **17** : 153–54.

The chromosome number of cells in two root tips taken from tillers of a clump of dry Napier grass was found to be tetraploid ($2n = 56$). The chromosome number of root tip cells of thick Napier grass or elephant grass was consistently $2n = 28$. The nuclei and cells of the tetraploid roots were found to be larger than those in the diploid. Other clumps of dry Napier have given root tips with the tetraploid number. The clumps are being maintained for meiotic investigation.

2279. SAURA, F. 633.288:576.312.35
Complemento diploide en algunas especies de *Briza*. **(Diploid complement of some species of *Briza*).**
Rev. Fac. Agron. B. Aires 1947 : **11** : 330–33.

Descriptions are given of the metaphase chromosomes of some *Briza* species. Chromosome numbers are as follows: *B. maxima*, $2n = 14$; *B. glomerata*, $2n = 14$; *B. stricta*, $2n = 28$; and *B. subaristata*, $2n = 28$.

## LEGUMINOUS FORAGE PLANTS 633.3

2280. 633.3:581.48:581.192(94.1)
SNOOK, L. C. 633.3:35:581.192:575.42(94.1)
**Locally grown leguminous seeds. Their composition and food value.**
J. Dep. Agric. W. Aust. 1947 : **24** : 300–12.

Data are given on the chemical composition of seeds of the following legumes grown in Western Australia: *Pisum arvense*, *Lupinus varius*, *Lupinus angustifolius*, *Lupinus luteus*, *Lathyrus tingitanus*, *Lathyrus sativus*, *Lathyrus ochris*, *Vicia dasycarpa*, *V. monantha* and *V. sativa*.

It is noted that the Palestinian vetch (*V. dasycarpa*) and *V. monantha* appear to be free from toxic compounds, suggesting that selection of toxin-free strains of vetch may be possible.

2281. 633.3–2.111–1.521.6(48.5)
SCHWANBOM, N. 633.2–2.111–1.521.6(48.5)
Fyra års erfarenheter rörande våra vallväxters vinterhärdighet. **(Four years' experience regarding the winter hardiness of our herbage plants).**
Agri Hortique Genetica, Landskrona 1947 : **5** : 106–15.

Detailed records from Weibullsholm are given of the winter hardiness of red clovers, white clovers, blue lucerne and many of the meadow grasses, e.g. *Cynosurus cristatus, Lolium perenne, L. multiflorum,* and *Dactylis glomerata.* The performance of Danish, Swedish and other strains during 1939–42 and 1946–47 in Sweden is mentioned.

The advantages of such studies in testing breeding material are exemplified by reference to the two strains H.64 and H.71 of *Dactylis glomerata* which had been regarded as promising until they exhibited serious winter injury in spring 1942.

2282. 633.31:575.42(71)
633.31:575.12(71)
633.31:581.162.3(71)

BOLTON, J. L.

**A study of combining ability of alfalfa in relation to certain methods of selection.**

Sci. Agric. 1948 : **28** : 97–126.

A useful review is given of literature on the genetics, cytology, fertilization, tripping and disease resistance of lucerne, and breeding techniques. The bibliography cites 56 references.

The experiments reported were conducted at the Dominion Forage Crops Laboratory, Saskatoon. The selections studied originated from the Grimm strains, Sask. 451 and Sask. 666, and Ladak. Three general groups of selections were used: (1) a white flowered group, used in cross-pollination experiments, and selected in fields grown from open pollinated seed; (2) an inbred group consisting of plants inbred for one or more generations, and selected for self-tripping and self-fertility; and (3) an open-pollinated group selected for high seed setting among plants raised from open-pollinated seed; two of the plants in group (1) gave sufficiently high seed yields to be included in this group also.

The progenies of open-pollinated clones of white-flowered plants were classified for flower colour to give data on cross-pollination. The percentage cross-pollination varied from 11–100%, and was usually about 90% or over.

Ratings were obtained in the greenhouse on the self and cross-fertility of over 100 plants. Self-fertility ranged from 0·02 to 5·22 seeds per flower selfed, with an average of 1·58; the cross-fertility varied from 2·67 to 8·26 seeds per pod, with an average of 5·54.

Selfed seed from plants inbred for one, two or three generations was sown in seed yield plots, and tested under conditions of open-pollination. The seed yield varied from 0 to over 60 lbs. per acre, and the data indicated that it is possible to select inbred lines which, even in the third generation, will yield 40 to 60 lbs. of seed per acre under open-pollination.

Each of five $S_2$ plants derived from selection S–38–33 were selfed, intercrossed and outcrossed, and the resulting seed planted in seed yield plots. The progeny of the intercrosses were intermediate in seed and forage yield between comparable inbred lines and outcross progenies.

With very few exceptions, the progeny of reciprocal crosses showed no difference in seed production.

A group of selected plants from the open-pollinated group and a group of selected plants from the inbred group were crossed in all possible combinations within each group to test combining ability. Considerable differences in the combining ability of the parents, as shown by seed and forage yields of the progenies, were found. The data on the combining ability of the open-pollinated group suggested that tester plants may be useful in determining combining ability where large numbers of plants have to be tested.

The method of selecting parent plants for breeding which has been developed at Saskatoon is described. Selections in the field for fertility are obtained; where disease resistance is desired a mass population of disease resistant plants is selected. Selection is based upon percentage of pod setting and the number of seeds per pod. The selected plants are transplanted to the greenhouse in September and further selected during the winter months. Self-tripping types are discarded. Self- and cross-fertility ratings are obtained for each plant, and progenies from the selfed and crossed seed are grown. The selfed seed is used for testing for any undesirable recessive genes, while the crossed progenies provide a test of combining ability. The cross-fertility ratings serve as a basis for eliminating plants low in cross-fertility. Before spring, each remaining plant, presumably cross-fertile and non-self-tripping, is cloned and established in the polycross nursery. The seed obtained for this nursery is used for seed and forage tests which provide an estimation of combining ability. Finally, the better plants are intercrossed and the various combinations studied to provide a final estimation of the probable value of each in synthetic or hybrid combinations. The use of selected parents is discussed under the headings of (1) increase of a single line, (2) synthetic varieties, and (3) the production of commercial hybrids. An alternative method of producing hybrids to that devised by Tysdal and his co-workers (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 244) is suggested, which has the advantage that less vegetative propagation is entailed. This plan suggests that non-self-tripping and self-fertile plants could be used. It is considered that competition between inbred and hybrid plants may minimize the effect of rather large proportions of selfed seed and thus permit the use of these self-fertile parents, which are propagated by seed for utilization in the single crossing plots.

2283. TOMÉ, G. A. 633.31:581.036:576.356.5
Dos casos de poliploidía en alfalfa (*Medicago sativa* L.) [**Two cases of polyploidy in lucerne (*M. sativa* L.).**
Rev. Fac. Agron. B. Aires 1947 : **11** : 299–307.

A polyploid lucerne plant has been obtained by high temperature treatment at 41–45° C. for one hour, and another has occurred spontaneously in the field.

2284. REITZ, L. P., ET AL. 633.31–2.482–1.521.6:575(78.1)
**Reaction of alfalfa varieties, selections and hybrids to *Ascochyta imperfecta*.**
J. Agric. Res. 1948 : **76** : 307–23.

Field and greenhouse experiments were carried out at the Kansas Agricultural Experiment Station on the reaction of *Medicago* species, varieties and strains to black stem (*A. imperfecta*). In the artificial inoculation tests conducted in the greenhouse, plants were scored for (1) number of leaf lesions, (2) size of leaf lesions, (3) defoliation, (4) petiole lesions and (5) stem lesions. The variety Ladak formed the control.

In a field test of varietal susceptibility during 1939, significant intervarietal differences were observed, the Turkistan varieties being more susceptible than Ladak or Kansas Common. In a field test during 1942, observations were made on 66 strains of various origin, including a few foreign introductions. The strains showed significant differences in reaction to black stem attack. A–169 from Nebraska, A–155 from Rhode Island, and 128 and A–131 from Wisconsin were the most resistant strains according to the scores made in this test; of the standard varieties, Grimm and Dakota Common possessed the highest degree of resistance.

Under greenhouse conditions observations were conducted on artificially inoculated plants of the following varieties: Turkistan 86696, Turkistan 19304, Ladak, Kansas Common, Kansas Common Selection, Grimm, Hairy Peruvian 22486, *M. falcata* F.C. 30114, *M. ruthenica* F.P.I. 190365 and Semipalatinsk F.C. 22613. The total scores for disease ranged from 2·38 for *M. ruthenica*, the most resistant type, to 6·19 for Hairy Peruvian. Kansas Common was more susceptible than Turkistan varieties in this test, a result which does not agree with field observations; the two types may therefore react differently under conditions of natural and artificial infection. The ranking of varieties according to size of lesions and number of lesions usually showed a close correspondence. Within a variety wide variation in disease reading was observed.

Pedigree lines of bacterial wilt resistant selections of Kansas Common, tested in the greenhouse with artificial inoculations of *A. imperfecta*, showed considerable variation both within and between the different lines in black stem reaction.

At least two plants were selected from each of the following varieties, one being relatively susceptible to black stem and the other relatively resistant in the given variety: Kansas Common, Ladak, Turkistan, Hairy Peruvian and Kansas Common Selection. These selected plants were inbred for one generation. Selections of *M. falcata* and Semipalatinsk were also inbred. The results from the varieties and species showed that the $S_1$ progenies tended to resemble their respective parent in reaction to black stem infection. An $S_2$ generation was produced in some cases. The disease reactions of the $S_1$ and $S_2$ progenies proved to be significantly and positively correlated. The variation in disease readings was lower in the $S_2$ than in the $S_1$, as would be expected with an increase in homozygosity.

In a cross between the highly susceptible inbred plant Hairy Peruvian No. 33 as male parent and the highly resistant inbred plant *M. falcata* No. 39, and the reciprocal cross, the resistance of the latter parent appeared to be dominant.

Crosses were carried out between open-pollinated plants of different varieties and species. Each cross produced both resistant and susceptible progenies. The $F_1$ generations from the ten crosses studied did not differ statistically in readings of black stem infection, possibly because of the small number of plants available; but the pooled $F_1$ lines showed highly significant differences in degree of infection.

Crosses and back-crosses involving inbred lines of Ladak and other varieties were also studied. The $F_1$ of crosses between inbred lines and the back-crosses showed highly significant differences in indices of infection, in contrast to the result obtained in the $F_1$ of crosses between open-pollinated plants; probably this may be explained on the grounds of the larger numbers in the $F_1$'s between the inbreds and in the back-crosses, the more nearly homozygous constitution of these parents, and the closer selection of parents, rather than the result of inbreeding itself.

The value of selecting for black stem resistance in inbreeding heterozygous material is demonstrated by the data on selections of Kansas Common and other varieties. Crosses between open-pollinated plants produced more resistant $F_2$ offspring if both parents were resistant than if one or both of the parents were susceptible. The data from the $F_1$ of crosses between inbreds of Ladak and other varieties showed that the $F_1$'s were intermediate between the parents in reaction to black stem.

It is pointed out that selection for resistance without inbreeding was successful, and that the highest level of resistance obtained by selecting among inbreds was equalled by selections of open-pollinated stocks.

The glossy hairless leaf surface in Ladak which makes thorough wetting of the leaves difficult, may be associated with resistance to black stem, in contrast to a leaf surface covered with epidermal hairs, as in Hairy Peruvian.

Physiological races of black stem were isolated.

2285. Brown, B. A. and 633.31.00.14(74.6)
Munsell, R. I. 633.31–2.3–1.521.6(74.6)
**Alfalfa varieties and seed mixtures.**
Bull. Storrs Agric. Exp. Sta. 1947 : No. 258 : Pp. 13.

Twelve varieties of lucerne were tested at Storrs, Connecticut, for development of stands, prevalence of leaf spot and wilt, boron deficiency and yield of dry matter. There was a definite connexion between the prevalence of wilt and reduction in stands, Buffalo, a wilt resistant variety, having a 90% stand at the end of the fourth harvest season, while Grimm, Ontario, Variegated, Nebraska Common and Hardigan which are susceptible to wilt were reduced to 14–35% stands.

2286. Schelhorn, M. v. 633.311:576.356.5:575.127.2(43)
Zur Cytogenetik von *Medicago falcata* L. **(On the cytogenetics of *M. falcata* L.).**
Züchter 1946 : **17/18** : 92–93.

In 1938 Stählin found the chromosome number $2n = 32$ for *Medicago falcata* growing wild near Jena. For *M. falcata* in a wild stand near Obermenzing the authoress found $2n = 16$, $n = 8$; another series of collections of *M. falcata*, of different origins, from Upper Bavaria, showed the same numbers $2n = 16$, $n = 8$. Thus the diploid form is more common than the tetraploid in Upper Bavaria. It is known that the tetraploid main strain occurs widely in Europe, Siberia and the Northern Caucasus and a diploid strain is found in Dagestan and Kazahstan. It seems that in Germany the transition from diploid to tetraploid occurs readily in nature. An example is given in which cross-pollination of a true *M. falcata*, taken from a wild stand and having $n = 8$, with *M. media* and a true *M. sativa*, both tetraploids, gave hybrids with $n = 16$, which was the number of the two possible male parents, *M. media* and *M. sativa*. E. W.

2287. 633.32:575.42:007(47)

**Stalin prizes for science in 1947.**

Soviet News 1948 : No. 1950 : **1**–2.

A first Stalin prize has been awarded to P. Lisicyn [P. Lissitsin] for his work on clover selection.

2288. 633.32:581.162.5:575.14

MYERS, W. M. 633.32:576.354.4:575.14

**Increased meiotic irregularity and decreased fertility accompanying inbreeding in *Dactylis glomerata*.**

J. Amer. Soc. Agron. 1948 : **40** : 249–54.

Second inbred generation progenies were grown from each of 12, 10 and 8 first inbred generation plants selected from three families of *D. glomerata*, and compared with the $I_1$ generation parental clones with regard to the seed set of selfed panicles under bag and of open-pollinated panicles. The 12 plants from family 37–4 (18) showed a seed set when selfed ranging from 8·0% to 73·6% of that of corresponding $I_1$ clones. The progenies of the other two families showed a similar reduction in seed set when selfed. The general reduction observed is similar to that previously reported for the $I_1$ generation in comparison with the original parents (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 861). The seed setting behaviour of progenies in family 37–4(18) when open-pollinated was similar to that observed in the bagged panicles, the 12 plants giving on the average 41·5% of the seed set per panicle of the $I_1$ clones. The other two families gave similar results when open-pollinated. In each family, the relative reduction in seed set under bag was greater than the reduction in seed set with open-pollination, suggesting that a decrease in self-compatibility may have accompanied inbreeding.

Cytological examination of the microspores revealed that average quadrivalent and chiasma frequencies in $I_1$ and $I_2$ plants are similar, but that the frequency of univalents at metaphase I in the $I_2$ plants increased four to six times in comparison with the $I_1$ parents. An increase in the frequency of such meiotic irregularity has also been observed in the $I_1$ compared with the original parents (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 553).

2289. K........, U. 633.32–2.421.6–1.521.6(49.4)

Der Kleekrebs. (**Clover rot**).

Die Grüne Schweiz. landw. Z. 1947 : **75** : 1339–42.

*Sclerotinia Trifoliorum*, which causes clover rot, grows mainly from October to May. Temperatures in November and December affect the degree of the disease, relatively warm weather promoting attack. Investigations showed that different types, not subspecies or races, of the fungus exist, differing chiefly in virulence.

Species of clover differ in susceptibility to the fungus. The greatest damage is caused to crimson and red clover. Lucerne is the most resistant, and satisfactory resistance is also shown by alsike and white clover, whereas yellow clover and kidney vetch are fairly severely attacked. Varieties and forms within a species also differ in susceptibility, for example the late forms of red clover are often distinguished by a certain resistance.

Preventive measures are (*a*) partial replacement of red clover by the less susceptible species and where suitable by lucerne, and (*b*) elimination of crimson clover which promotes increase of the fungus. E. W.

2290. BINGEFORS, S. 633.321:575(48.5)

Klövernematod och klöverröta—ett allvarligt hot mot vallodlingen. (**Clover nematode and clover root rot—a dangerous menace to grassland cultivation**).

Försök och Forskning 1947 : **4** : 90–92.

This paper deals in detail with the subject of clovers resistant to the above pests, which was already treated in an article by the author and two collaborators (cf. Abst. 1652).

2291. 633.321:575.14

**Nijdam, F. E.** 633.321:575.14.061.6

Inteelt bij rode klaver. **(Inbreeding red clover).**

Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 12 April, 1946 Wageningen No. 46/4 : 69–74. (Mimeographed).

Inbreeding clover is hindered by cross-incompatibility, degeneration, and segregation of recessive factors.

East's incompatibility hypothesis, developed for tobacco, appears to fit red clover completely.

Considerable degeneration occurs as a result of breeding within a family, so that line selection is not attractive.

The splitting off of recessive forms is an interesting phenomenon. It is probable that an ordinary (local) variety harbours a variety of recessive factors, which pass unnoticed in normal crossing. F. E. Nijdam, the speaker, has analysed the genotype for flower colour of normal red clover as $G\ G\ B_1\ B_1\ B_2\ B_2\ E\ E$, where $G$ recessive = white, $B_1$ or $B_2$ recessive = rose, $E$ recessive = blue. Other examples of the working of recessive factors are: a factor *a* which provides the seed with a black nose, a factor *d* that gives dwarfed growth, and another factor that does this in a less pronounced manner. S. J. Wellensiek asked about the effect of colchicine treatment on red clover, as it is generally without effect on Papilionaceae. R. Prakken replied that he had seen a very fine tetraploid clover produced this way in Sweden. In reply to A. E. H. R. Boonstra's question whether white flowered plants should be thrown away, because they indicate inbreeding, F. E. Nijdam replied that plants without anthocyanin give yellow seed, but this is apparently of no practical importance. Strong white flowered plants exist. C. B.

2292. 633.321:581.162.5(48.1)

**Wexelsen, H.** 633.321–1.531.12(48.1)

Hva kan gjøres for å øke var rødkløveravl? **(What can be done to increase our red clover acreage?)**

Samvirke, Medd. Felleskjøpet, Oslo 1948 : **43** : 79–82.

Pollination by bees, the most effective kind of bees, and contract seed production of good local and other red clover strains are among the points discussed.

2293. **Schelhorn, M. von** 633.35:581.143.32:575

Über eine erbliche Umbildung der Blütenstände bei *Vicia villosa.* **(A heritable aberration in the inflorescences of *V. villosa*).**

Züchter 1947 : **17–18** : 153–55.

In a breeding strain of *V. villosa* from Rumanian material, a plant was found showing proliferation, though otherwise normal. Instead of the inflorescences with 20–30 separate flowers, this plant had only about ten separate flowers in each group and at the end of each group of flowers were leaf shoots or the beginnings of shoots. The proliferations continued to grow whilst the flowers were fading and the fruit was developing. Over a period of ten years the progenies from this plant were observed and each year a number of proliferating plants appeared. In 1946 three individual progenies showed proliferation in all the plants. The mechanism of the inheritance of the tendency to proliferation is not yet known, but the author suggests that a hormone, similar to that postulated by Harder and Witsch for development and suppression of flowering may be a cause of proliferation and that certain genes may control this hormone. E. W

2294. **Smith, W. K.** 633.366:575.127.2:581.192:575.11

**Transfer from *Melilotus dentata* to *M. alba* of the genes for reduction in coumarin content.**

Genetics 1948 : **33** : 124–25. (Abst.)

$F_1$ hybrid plants obtained by crossing the coumarin free species *M. dentata* and *M. alba* are chlorophyll deficient, surviving only a few days when raised in soil. Grafting the seedlings on common sweet clover has overcome the difficulty, and mature hybrids have been secured by this technique. Selfing the hybrids produced no seed, but a seed set was obtained by back-crossing to *M. alba*. Data from the back-cross progeny indicate that two main genes are present in *M. dentata*, one reducing the coumarin content from 2·5% to 0·5% and behaving as a recessive to the gene for high content, and the other reducing the coumarin content to 0·1%. In combination, the two main genes impart the character of freedom from coumarin to *M. dentata.*

2295. Bjälfve, G. 633.367:581.43
Baljväxternas rotknölar hos olika sorter. **(Legume root nodules in different varieties).**
Medd. LantbrHögskolans Baljväxtlaboratorium 1947 : No. 10 : 8–12.

Two varieties of blue bitter lupins, and five of blue sweet lupins and four varieties of yellow sweet lupins were used in this preliminary experiment.

It appears that nodule formation varies greatly in different varieties and that their abundance and distribution directly affect the yield.

2296. Smirnova-Ikonnikova, M. I. 633.367:581.6(47)
**(Alteration of alkaloid content in sweet lupins).**
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : p. 64.

Analyses have shown that if sweet lupins are allowed to become in the slightest degree impure their alkaloid content rises very quickly.

2297. Schwarze, P. and
Wollner, Fr. 633.367:581.6:578.08
Ein Serienverfahren zur Bestimmung des Alkaloidgehaltes in Süsslupinen. **(A method for a series of estimates of alkaloid content in sweet lupins).**
Züchter 1947 : **17-18** : 105–09.

A quantitative method for estimating alkaloid in a series of sweet lupin samples is necessary for the breeder in judging strains and for seed testing centres which must maintain the purity of seed.

The alkaloid content of yellow lupins is determined by a method similar to that of Meyer for blue and white lupins, and in such a way, that the relatively high solubility of lupinine silico-molybdic acid compound causes no error. The process is simplified and time is saved by taking aliquot parts of the ether-chloroform extract and of the acidified aqueous extract, instead of extracting completely as in Meyer's technique. The method ultimately depends on the formation of a molybdenum blue and so the use of Schuhknecht and Waibel's photo-electric apparatus, designed for experiments in series, is recommended.
E. W.

2298. de Soyza, D. J. 633.39(54.5)
**Some Ceylon fodder bearing trees.**
Trop. Agriculturist 1947 : **103** : 94–104.

A list is given of the 82 local and introduced species of trees in Ceylon, suitable as a source of fodder. The list provides information on local names, botanical family, distribution in Ceylon, type of tree, propagation, areas recommended for planting, and the parts used by livestock.

## ROOTS AND TUBERS 633.4

2299. 633.41:576.356.5:575.12(48.9)
Frandsen, K. J. 633.41.00.14(48.9)
Nye Iagttagelser over tetraploid og triploid Foderbede. **(Further observations on tetraploid and triploid forms of fodder sugar beets).**
Foreløbig Meddelelse fra D.L.F.s og F.D.B.s. Foraedlingsvirksomhed paa Øtoftegaard 1947 : Pp. 8.

Some of the tetraploid forms of crop plants previously obtained (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 145) have now been included in field trials, and the present report records results of observational experiments with tetraploid and triploid fodder beets as compared with the normal diploid sugar mangel, Hvid Øtofte [White Øtofte).

The tetraploids yielded only 70-80% of dry matter of the diploid forms. Nevertheless allowance must be made for (1) the fact that the tetraploid material is derived from two plants chosen at random, and cannot therefore be any criterion of what a tetraploid of Hvid Øtofte might yield; and (2) the possible effects of inbreeding having decreased the yielding capacity.

The triploid material for the comparative field trials was obtained by crossing strains of the diploid yellow fodder beets, Barres Øtofte, Barres Slättbo and the sugar mangel Gul Øtofte [Yellow Øtofte] with the tetraploid white sugar mangel, Hvid Øtofte.

The 80–90% of triploids obtained contained 6–27% more dry matter than that of the diploid standard.

Further studies of triploid production on a large scale, and of its technique, will be made, and the resulting plant material will be tested in 1947.

2300. 633.42:582
635.3:582
635.44:582
MUSIL, A. F. 633.853.49:582
**Distinguishing the species of *Brassica* by their seed.**
Misc. Publ. U.S. Dep. Agric. 1948 : No. 643 : Pp. 35.

The classification of the genus *Brassica* is discussed, descriptions of species are given and it is explained how the species can be distinguished by their seed characters. A key for distinguishing them in this way and descriptions and illustrations of the seeds are included.

2301. RÖSSGER, W. 633.425:581.143.26:581.036(43)
Niedere Anzuchttemperatur als Ursache der Schosserbildung bei Kohlrabi. Versuche über die Auslösung von Schosser und Prüfung der Kohlrabi-Sorten auf ihre Schossneigung bei verschiedenen Anzucht- und Kulturtemperaturen. (**Low temperature during raising of seedlings as a cause of bolting in kohlrabi. Experiments on the induction of bolting and on the testing of varieties of kohlrabi for their tendency to bolt at different temperatures of raising and cultivation**).
Züchter 1947 : **17-18** : 121–46.

Twenty varieties of kohlrabi were tested for their tendency to bolt, when the seedlings were raised and the crops grown at various temperatures. Conditions of moisture were not studied, since summer crops of kohlrabi never bolt, despite frequent lack of water.

Results showed that cold treatment is a primary cause of bolting and that the intensity and duration of the cold regulate the amount of bolting. A temperature of 8·5° C. during the raising of seedlings, followed by an average of 11·8° C. in the field, produced 100% bolting. Small rises of temperature, within the range which produces bolting, were found to increase bolting, and especially its rate, in plants which had previously or subsequently been given cold treatment. Outside this range, however, higher temperatures decrease or even eliminate the tendency to bolting, induced by low temperature. The optimum temperature for the raising of seedlings is from 16° to 18° C. Varieties of kohlrabi differ markedly in their tendency to bolt. Throughout its development the kohlrabi plant is sensitive to cold treatment, but the blue and pale blue varieties and the white varieties of Viennese origin were far more sensitive than any of the other white varieties. Two types of Prager Weisser Treib were found to be notably resistant to cold treatment. Roggli's Freiland is to be regarded as non-bolting, but is not so satisfactory as the other early varieties in the final stage ready for marketing.

Directions for increasing yields are indicated for use in cultivation and in testing for the variety register and also for the guidance of the breeder. E. W.

2302. 633.491(41)
**New varieties of the potato introduced since 1939.**
Leafl. Dep. Agric. Scot. 1948 : No. 2 : N.S. : Pp. 8.

Notes are given on the following groups of potato varieties introduced into cultivation in Scotland since 1939:—

I. Varieties recommended for registration in 1947:—Craigs Royal, Craigs Snow-White and Orion.

II. Unregistered varieties which have established themselves on the market: Homeguard.

III. Unregistered varieties which so far have not established for themselves a substantial position on the market: Arran Viking, Craigs Bounty, Dr McIntosh and Red Fife.
IV. Varieties registered primarily for war-time use: Doon Bounty and Vanguard.
V. Varieties with some defects and which have made little or no headway in the trade, or the growing of which is being discouraged by the raisers: Doon Eire, Doon Well, Doon Castle, Strathearn Early, St. Aidan, Saturn, Venus and Stormont Star.
VI. New Irish varieties: Ulster Chieftain, Ulster Premier, Ulster Prince, Ulster Emblem, Ulster Ensign, Ulster Commerce, Ulster Cromlech, Ulster Earl, Ulster Leader, Ulster Supreme and Stormont Dawn.
VII. Foreign varieties: the Dutch variety Record.

2303. SKAARE, S. 633.491(48.1)
Valg av potetsort. (**Choosing a potato variety**).
Samvirke, Medd. Felleskjøpet, Oslo 1948 : **43** : 77–79.

Descriptions are given of varieties cultivated in Norway for industrial and table purposes and for fodder, including some that are suitable for all three purposes combined.

2304. WATTSON, H. (MATTSON, H.] 633.491(73)
**New potato varieties introduced in 1947.**
Amer. Potato J. 1948 : **25** : 104, 106.

The introduction in 1947 of the following potato varieties is announced: Yampa; LaSoda (cf. Abst. 2308); Waseca, Chicago and Satapa (cf. Abst. 2308); Cortland, Essex, Fillmore, Glenmeer, Harford, Madison and Snowdrift (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1030); and Russet Sebago (cf. Abst. 2308).
Yampa is a white midseason variety adapted for cultivation in Colorado, and field resistant to scab, early and late blight, leaf roll and mosaic; it is also immune to virus X. Its origin is given as CS6317: Katahdin x S245–186.

2305. BIRAGHI, A. 633.491:575(46)
La patata da semina in Spagna. (**Seed potato in Spain**).
Riv. Ortoflorofrutticolt. ital., Firenze 1948 : **32** : 90–94.

Reference is made to the foundation of the Estación de Mejora del Cultivo de la Patata [Station for the Improvement of Potato Cultivation] in Spain in 1933, to the equipment of the station, and to its activities. The multiplication of healthy stocks has now been separated from the scientific work. A list is given of the varieties of which healthy seed is being produced, with indications of the synonyms, and it is suggested that some of them, or some of the new hybrids now under observation, might be of interest for growing in Italy.

2306. PAVLOV, I. P. 633.491:575(47)
(**Potatoes of mountainous Dagestan**).
Trudy Dagestanskogo Seljskohozjaĭstvennogo Instituta (Proc. Dagestan Agric. Inst.) 1941 : **3** : 131–43.

In 1938 a study was made of potato growing in the highlands of Dagestan and the findings are reported here. A great uniformity was observed in the varietal type, and the potatoes cultivated to-day have all originated from imported European varieties, of which the chief are Richter's Imperator and Early Rose. The former particularly is reproduced for seed only in certain villages that are famous for it and in this way is subjected to constant selection and is maintained at a high level of purity and productivity.

2307. DORST, J. C. 633.491:575(49.2)
Nationaal programma voor de aardappelveredeling. (**A national programme for potato breeding**).
Landbouwk. Tijdschr. Wageningen 1947 : **59** : 407–15.

In recent years the Committee for the Encouragement of Breeding and Examining New Varieties of Potatoes has distributed seed to some 100 growers and this year there are a couple of students at the Plant Breeding Institute, Wageningen, commissioned to carry out the required crosses in the hope that some 100,000 seeds will be available to growers. Regular visits to these growers are planned and promising varieties will be included promptly in preliminary trials.

This should be extended to a national scale with a central institute to obtain large quantities of seed to be distributed. Promising seedlings will be reported to the Committee and, if they prove suitable as parents, the grower rewarded. Such plants will be used as parents for the production of large quantities of seed for further distribution. C. B.

2308. MATTSON, H. 633.491:575(73)
**New potato varieties introduced in 1947.**
Amer. Potato J. 1948 : **8** : 133–34.

Brief notes are given on the following potatoes introduced during 1947 in the United States: LaSoda, Chisago, Satapa, Waseca, Cortland, Essex, Fillmore, Glenmeer, Harford, Madison, Snowdrift and Russet Sebago.

LaSoda, developed from the cross Triumph x Katahdin, has medium maturity, and is ready for harvesting one week later than Triumph; it produces tubers with bright pinkish red skin. The variety has been produced by J. C. Miller, Louisiana State University.

Chisago, Waseca and Satapa have been developed by F. A. Krantz, University of Minnesota. The two first named varieties are early, the last named is medium in maturity. These three varieties have equalled Cobbler in yield, and have produced a higher proportion of tubers of the size US. No. 1 than Cobbler and Red Warba. Satapa and Waseca have red-skinned tubers.

Russet Sebago is a russet mutation of Sebago, developed by G. H. Rieman, University of Wisconsin. It is late maturing and more scab resistant and tougher skinned than Sebago. The remaining seven varieties have been produced by D. Reddick, Cornell University (cf. Abst. 1030). They are only slightly susceptible to late blight, and their relatively high degree of resistance may be adequate for areas where blight is not a serious problem. In areas where blight is a more serious disease, these varieties may relieve the grower of dusting or spraying except during the latter part of the season. Essex and Snowdrift are early varieties, Fillmore and Madison medium, and Cortland, Glenmeer and Harford late varieties. Glenmeer produces red-skinned tubers.

2309. MILLER, J. C. 633.491:575(76.3)
**Three new varieties of Irish potatoes.**
Amer. Potato J. 1948 : **25** : 89–91.

The varieties DeSota and LaSalle (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 615) and LaSoda (cf. Abst. 2308), developed at the Louisiana State University, Baton Rouge, are described.

2310. SCHNELL, L. O. 633.491:576.356:575.127.2
**A study of meiosis in the microsporocytes of interspecific hybrids of *Solanum demissum* x *Solanum tuberosum* carried through four back-crosses.**
J. Agric. Res. 1948 : **76** : 185–212.

Meiosis was studied in the microsporocytes of *S. demissum* ($2n = 72$), *S. tuberosum* ($2n = 48$) represented by the pollen-fertile varieties Katahdin Earlaine and the pollen-sterile variety Russet Rural, $F_1$ hybrids between these two species, and the first to fourth back-crosses to *S. tuberosum*.

Meiotic irregularities observed in the hybrids included lagging chromosomes, spindle abnormalities, high numbers of multivalents, delimitation of fewer or more than four spores, and in most cases pollen sterility. In the divisions resulting in pollen sterility, groups of chromosomes retaining their primary synaptic associations were observed throughout the various stages of meiosis, particularly in the anaphase spindles. It is suggested that nucleic acid starvation due to malfunctioning of the chromosomes in the cytoplasm may be a cause of the retention of associations and of bridge formation. The various irregularities were observed in the $F_1$ hybrids and subsequent back-crosses. The third and fourth back-cross generations tended to be somewhat less regular in meiosis and less sterile. Meiosis in these generations, however, remained highly irregular, and the plants retained many of the undesirable characters of *S. demissum* as well as chromosome numbers approximating those of the $F_1$ hybrids. Some evidence of autosyndesis of *S. demissum* and of *S. tuberosum* chromosomes was obtained.

In view of the meiotic irregularities found, the conclusion is reached that breeding for blight resistance by using *S. demissum* x *S. tuberosum* must remain primarily a trial and error method.

2311. KELLY, W. C. and
SOMERS, G. F. 633.491:577.16:575:581.165.71(74.7)
**The influence of certain rootstocks and scions on the ascorbic acid content of potato tubers.**
Plant Physiol. 1948 : **23** : 338–42.

Grafting experiments were carried out to determine whether varietal differences in the ascorbic acid content of potato tubers are due to the genetic constitution of the aerial portion of the plant or to the genetic constitution of the tubers themselves.
Reciprocal grafts were made between potato varieties having tubers with different ascorbic acid contents. Potato rootstocks were also grafted with tomato scions. It was found that the ascorbic acid content of the tubers was not affected by the scion; this property of the tubers therefore depends upon the genetic constitution of the underground part of the plant and is independent of the genetic constitution of the aerial portion. In breeding for high ascorbic acid content in the potato, little or no emphasis need be placed on the ascorbic acid content of the tops.

2312. RATERA, E. L. 633.491:581.331.2:581.162.5
Contribución al estudio del polen de papas. Observaciones en algunas variedades de papas cultivadas y en especies salvajes afines. (Segunda contribución). [**Contribution to the study of the pollen of potatoes. Observations on some cultivated varieties of potatoes and on some related wild species. (Second contribution)**].
Rev. Fac. Agron. B. Aires 1947 : **11** : 277–85.

Observations on the fertility and morphology of the pollen grains of the following potatoes are reported: *Solanum tuberosum* vars Ackersegen, Gloria, Inverness, King Edward, Menominee, Pawnee, Pontiac, Sebago, Sequoia and Up to Date; *S. andigenum* vars Del Cerro [Montane], Runa Blanca [White Runa] and Runa Colorada [Coloured Runa]; *S. Commersonii*; *S. Henryi*; *S. Macolae*; *S. Millanii*; and *S. simplicifolium.*

2313. RASMUSSEN, L. 633.491:581.6:578.08(48.9)
Forsøg vedrørende Kartofler. Udført under Ledelse af Kartoffelkvalitetsudvalget. (**Experiments on potatoes. Carried out under the direction of the Committee on Potato Quality**).
Beretn. Planteavl. Sjaelland 1943 (1944) : 186–98.

An account is given for 1943 of the work carried out in Denmark under the direction of the Committee on Potato Quality. The experiments concerned the effects of manuring and of storage upon quality of potatoes. The methods used in the necessary cooking tests are set out (cf. Abst. 1018).

2314. 633.491:582(48.5)
"Östergyllen—Favorit" synonym med Potatissorten President. (**Östergyllen and Favorit", synonyms of the potato variety President**).
Försök och Forskning 1946 : **3** : p. 166.

The identity of the potato varieties Østergyllen and Favorit, widely grown in Sweden, with the Dutch variety President has been confirmed. The origin of the latter is given.

2315. 633.491–1.524(45)
**American potatoes in Italy.**
F.A.O. European Bull. 1948 : No. **5** : 388–89.

A note is given on a trial in Tuscany of the introduced potato, Irish Cobbler, a variety grown extensively in the United States. The variety showed promise.

2316. MATTINGLEY, G. H. 633.491–1.524(94)
**Potato varieties in Victoria.**
J. Dep. Agric. Vict. 1948 : **46** : 193–98.

Potato varieties introduced from the U.S.A. into Victoria have proved more satisfactory than varieties of British origin. Bald has suggested that this is because the American varieties have been developed under conditions more closely resembling those prevailing in Australia. Notes are given on the commercial varieties Early Carman (Green Mountain), Late Carman, Snowflake, Katahdin, Up-to-date and Sebago. An account is also given of trials, consisting mostly of varieties from U.S.A., which were established at Geelong and three other locations in 1946.

2317. Hogen Esch, J. A. 633.491–1.532.2(49.2)
Actuele problemen rond de pootaardappel. **(Current seed potato problems).**
Landbouwk. Tijdschr. Wageningen 1947 : **59** : 400–07.

After briefly describing the work being done in other exporting countries, viz. Denmark, Great Britain, Ireland, Czechoslovakia, Canada and France, attention is paid to storage of early lifted seed potato; seed grown on clay or sand; testing of Dutch varieties abroad; and the international importance of protecting breeders' rights.

Although early lifting of potatoes in sandy soils gives as healthy seed as from clay soils, the keeping quality is less good, especially with Bintje.

Objections raised to Bintje by France, Belgium and Switzerland include non-immunity to wart disease, great susceptibility to blight, and the frequent occurrence of *Fusarium* rot in the tubers. C. B.

2318. Hill, R. E. 633.491–2–1.521.6
**Research on potato insect problems—a review of recent literature.**
Amer. Potato J. 1948 : **25** : 107–27.

Recent literature relating to the control of insects attacking the potato is reviewed. The problems of varietal response to insect attack and insect transmitted diseases, and of varietal response to insecticides and fungicides receive attention.

2319. Horn, M. 633.491–2–1.521.6:575(43.91)
Burgonyabetegségek és a növénynemesítés. **(Potato diseases and plant breeding).**
Szemle, Budapest 1941 : **10** : 177–82.

This is a general review on methods of breeding for disease immunity in the potato, describing breeding methods for resistance to wart, blight and virus diseases, and the technique of hybridization. The author claims to have several blight resistant lines. A few field methods of testing for resistance are described, which are cheap and make work possible in the absence of suitable facilities for artificial tests. T. P. B.

2320. Baribeau, B. 633.491–2.3–1.521.6
**Bacterial ring rot of potatoes.**
Amer. Potato J. 1948 : **25** : 71–82.

Information on the present status of bacterial ring rot disease of the potato is reviewed. It is mentioned that no varieties are immune from the disease; Teton, (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 749), however, has shown a high degree of resistance over a period of years in Wyoming and Maine, while in France the variety Furore has shown no trace of infection. A bibliography of 175 references is included.

2321. Rozendaal, A. 633.491–2.8–1.521.6(49.2)
Ziekten van het stengelbont-type bij de aardappel. **(Diseases of the stem-mottle-type of the potato).**
Tijdschr. PlZiekt. 1947 : **53** : 93–101.

On certain soils in the Netherlands certain varieties of potatoes show a greater or less degree of development of mosaic on the leaves, often with malformation as a result of suppressed growth of parts. The affected areas are grosser and of a paler yellow hue than in the case of normal mosaic. The green parts are often darker and more shiny than normal. In addition aucuba-like spots may occur, as may necrosis. Tips of the haulm may be killed, but this is not top necrosis. Often only parts of a plant are affected. In some varieties, especially Duke of York, necrotic spots and malformations occur in some of the tubers, while plants grown from affected and apparently healthy tubers may be

more or less affected. Plants may recover; this is not due to masking but to absence of virus.
The cause appears to be virus which seems to inhabit the soil, possibly as a facultative parasite.
Some of the symptoms resemble those of spraing and there may be some connexion with this disease and possibly with the so-called "ratelziekte" of tobacco.
Deep ploughing and the "spoil" from dykes are thought to favour the occurrence. C. B.

2322. HOVEY, C. and
BONDE, R. 633.491–2.8–1.521.6:578.08(74.1)
***Physalis angulata*, a test plant for the potato leaf roll virus.**
Phytopathology 1948 : **38** : 505–07.

*Ph. angulata* has been found to be a valuable test plant in investigations at the Maine Agricultural Experiment Station on the potato leaf roll virus.

2323. VERHOEVEN, W. B. L. 633.491–2.8–1.521.6–1.532.2(49.2)
Problemen bij de teelt van pootaardappelen. (**Seed potato growing problems**).
Landbouwk. Tijdschr. Wageningen 1947 : **59** : 415–20.

Early lifting of tubers to obtain healthy seed results in tubers that are easily skinned and do not keep well. It is suggested that the haulms be pulled before digging, so that the skin can harden and attack by fungi and bacteria is hindered.
Abnormal plants will this year be collected and the tubers grown again to see if they are infected with X or aucuba viruses. X-free varieties should be cultivated everywhere and those which are already infected, e.g. Duke of York and Red Bliss, should be carefully segregated from others like Eigenheimer and Alpha. If this were done virus X would soon present no problem, although pedigree cultivation must continue accompanied by serological control.
Some varieties, e.g. Gloria and Triumf, are 100% infected with aucuba virus, which causes pseudo-net necrosis in the tubers of Beteka, Deva, Katahdin, Libertas, Nederlander, Orion, Saskia and Wilpo, as well as the so-called monstrosities of Bintje. It is also widely distributed through Voran, Record and Ultimus. C. B.

2324. 633.491.00.14(41.5)
633.491–2.412.5–1.521.6(41.5)
**Potato variety trials.**
Leafl. Min. Agric. N. Ire. 1948 : No. 7 : Pp. 15.

A summary is given of the yields obtained from wart immune potato varieties and some commercial varieties susceptible to wart which have been tested at Stormont during the period 1937–47. Descriptive notes are included on the following wart immune varieties: Ulster Chieftain, Arran Pilot, Di Vernon, Ballydoon, Dunbar Rover, Arran Peak, Gladstone and Dunbar Standard. A report is also given of trials carried out during the period 1941 47 on the maincrop varieties Ulster Cromlech and Ulster Earl, raised by J. Clarke, Ballycastle, Co. Antrim, and of the variety Stormont Dawn developed by the Ministry of Agriculture, Northern Ireland, in comparison with standard maincrop varieties. Descriptive notes are included on Ulster Cromlech, Ulster Earl and Stormont Dawn. The following varieties introduced into commerce by J. Clarke during the years 1944 to 1947 are also described: Ulster Premier, Ulster Ensign, Ulster Leader, Ulster Supreme, Ulster Prince and Ulster Emblem. The results of their performance in comparison with standard varieties are summarized in tables.

2325. HARDENBURG, E. V. 633.491.00.14:578.08
**Effect of sprayer-wheel injury on the yield of potatoes.**
Amer. Potato J. 1948 : **25** : 128–30.

The results of experiments on the effect of sprayer-wheel injury on the yield of 24 potato varieties show that in varietal yield tests the factor of sprayer-wheel injury should be taken into account.

2326. Mikell, J. J.,
Miller, J. C. and
Edmond, J. B. 633.492:581.145.1:575.12(76.3)
**Flowering of the Jersey type sweet potato.**
Science 1948 : **107** : p. 628.

Sweet potato strains of the Jersey type possess several very desirable characteristics but fail to produce flowers. In 1947 however, at the Horticulture Research Department of Louisiana State University, two plants of Maryland Golden produced a few functional flowers. An account is given of the conditions under which this occurred. Of six cross-pollinations which were made, one between Maryland and seedling L–130 was apparently successful but the development of the ovary was checked by low temperatures.

2327. Anderson, W. S. and
Steinbauer, C. E. 633.492–1.524(73)
**Sweet canner from "down under".**
Sth. Seedsman 1948 : **11** : No. 4 : p. 13.

The sweet potato variety Australian Canner originated in New South Wales as a seedling selection from a lot of seed of unknown hybrid origin, supplied by the Hawaii Experiment Station in 1929. It was introduced into the United States from Australia in 1938 under the designation R–2358–1. Since 1941 the variety has been tested in several states.

The roots are small to medium in size, spindle-shaped and medium to late maturing, with salmon-coloured flesh, and a carotene content somewhat higher than that of Unit I Porto Rico. The variety stores fairly well. In yield of roots of canning grade it is considered to be equal to the best strains of Porto Rico. The haulms are trailing to semi-erect in growth habit. When canned whole the roots maintain their shape and possess an attractive uniform orange colour. The variety is susceptible to stem rot.

2328. Anderson, W. S. and
Steinbauer, C. E. 633.492–1.524(73)
**Australian Canner New variety.**
Sweet Potato J. 1948 : **3** : p. 3.

The sweet potato Australian Canner is described (cf. Abst. 2327).

2329. Cockerham, K. L.,
Dean, O. T. and
Miller, J. C. 633.492–2.7–1.521.6:581.192(76.3)
**Studies of new sweet potato seedlings and varieties for resistance to attack by the sweet-potato weevil.**
44th Proc. Ass. Sth. Agric. Wkrs. Miss. 1947 : p. 122.

In tests of the reaction of sweet potato seedlings and varieties to weevil attack at St Landry and East Baton Rouge, Louisiana, it has been noted that the potatoes of seedlings that showed the lowest infestation were high in moisture and carotene content and low in starch, and conversely those that showed the highest infestation were low in moisture and carotene contents but high in starch.

## FIBRES 633.5

2330. 633.51:575
**Progress reports from experiment stations. Season 1946-1947. Programmes of experiments. Season 1947-1948.**
Emp. Cott. Gr. Corp. Lond. 1948 : Pp. 152.

*Wells, W. G.* *Queensland. Regional Experimental Station, Biloela. Progress Report for the season 1946–47. (pp. 1–9).*

The jassid susceptible 43–9 strain of Miller was further tested. In bulk plantings it continued to show a higher lint percentage than commercial Miller. But progenies of the strain gave further indication that those with the strongest lint have lower ginning percentages than those with the weakest lint. Trials of this strain are to be continued.

Two jassid resistant strains of Miller from the family III–165 were increased; one strain produced 1 inch and the other $1\frac{1}{16}$ inch lint; yield tests of the strain are to be carried out.

In fibre strength these strains are superior to the present commercial jassid resistant Miller Lot I.

Work on jassid resistant hybrids continued. Miller x U. 4 and Miller x Rhodesian hybrids back-crossed to Miller were studied. Six years' selection from second back-crosses has apparently produced good uniformity in plant and lint characters and in leaf hair density; the fourth generation of a strain back-crossed to Miller four times also shows satisfactory uniformity. All these selections produce a lint of 1 inch or more, and are above the average in fibre strength.

Further back-crossing to the appropriate commercial parents of hybrids between Lone Star, Mexico Acala or Triumph on the one hand and Ferguson or Rhodesian cotton on the other was carried out.

High yielding jassid resistant Miller back-crosses and Umil 12 were crossed with Miller strain 43–9 to improve ginning percentage.

Strain trials were carried out on various types of soil; in each the jassid resistant hybrid material gave the highest yields, including four trials in which jassid attack was not a factor.

Further studies on leaf hair characters again revealed that the length of leaf hairs is adversely affected by dry conditions, and that leaf density is also usually reduced, but not to the same extent.

*MacDonald, D., King, H. E. and Wickens, G. M.* — *South Africa. Cotton Experiment Station, Barberton. Progress Report for the season 1946–47. (pp. 10–37).*

The main variety trial carried out comprised 23 U.4/5143 x Cambodia and U.4/8161 x M.U.8 strains in comparison with two standard U.4 strains, including U.4/5143. A trial consisting of U.4/5143, A.2106 (5143 x Cambodia), one U.4/8161 x M.U.8 strain, five selections of U.4/8161 x Sea Island, and Uganda B.P.52 is also reported.

Seed of A.2106 has been distributed in various parts of the Union.

The results of hybridization work on the improvement of lint quality in U.4 and M.U.8 are summarized. The following crosses have given no valuable results: Coker Wilds crossed with U.4 and M.U.8; Tidewater crossed with U.4; Gen 33 crossed with U.4/5143 and M.U.8; and B.P. 52 x Tangüis (*Gossypium barbadense*). Crosses of Meade with U.4, M.U.8 and B.P. 52 have given some fair material, but this group of hybrids has been discarded since more promising progenies are available. Crosses within *G. hirsutum* which offer most promise are M.U.8 x Tidewater, U.4/5143 x B.P. 52 and M.U.8 x B.P. 52. The interspecific crosses which appear to be valuable are U.4/8161 x Sea Island, U.4/8161 x Egyptian, and to a lesser extent, M.U.8 x Sea Island and B.P. 52 x Sea Island.

The results of all the experiments on leaf hairiness in relation to jassid resistance have led to the conclusion that, under conditions at Barberton, a degree of hairiness of the lower surface lamina represented by over 60 hairs per sq. cm. at a height of 0·5 mm. confers satisfactory resistance. Counts of 150 or more hairs of this height indicate a degree of hairiness which provides virtual immunity. A technique is described for making hair counts.

The adverse effect of drought, low soil fertility and possibly local climatic conditions other than rainfall upon hair development has been observed.

$F_7$ progenies of U.4 x Sea Island hybrids have been obtained which, as regards lamina hair counts, are in general superior to U.4; two of the progenies are markedly superior to A.2106.

The hybrid G. *anomalum* x G. *arboreum*, seed of which was supplied by J. B. Hutchinson, shows no superiority of hairiness over G. *hirsutum*. G. *armourianum*, from the same source, failed to develop at Barberton.

*G. Kirkii*, normally free from red bollworm eggs and larvae, may be attacked in the absence of other cotton plants.

Detailed investigations on varietal resistance to *Verticillium* wilt under conditions of natural infection and artificial inoculation are reported. The relationship between yield and the incidence of the disease receives analysis, and the possibility that factors governing productive capacity, inherent and environmental, are closely associated with "resistance" is considered. The effect of a number of different methods of inoculating plants grown in the field was studied. Experiments on the epidemiology of the disease are also being carried out. Data have been secured against the hypothesis of seed transmission; further experiments are to be made before reaching a final conclusion.

The reaction to all phases of bacterial blight (*Xanthomonas malvacearum*), i.e. angular leaf spot, blackarm and bacterial boll disease, of strains and varieties of known genotype in respect to the genes $B_2$ and $B_3$ for resistance is receiving attention.

In inoculation experiments on internal boll disease (*Nematospora Gossypii*), varietal differences in intensity of staining as indicated by lock weight, have been observed. It is unknown at present whether these differences are inherent or due to environmental influence.

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| *Needham, T. J. and*<br>*McKinstry, A. H.* | *Southern Rhodesia. Season 1946–47. (pp. 38–39). Cotton Research Station, Gatooma. Progress Report for the season 1946–47. (pp. 39–48).* |

In one strain trial, 12405 and 12204, derived from (Gatooma U.4 x Cambodia) x U.4 back-crosses, and 9 L34, the strain at present in commercial cultivation, gave the highest yields. These results confirm those of the previous season.

In another strain trial nine strains from Barberton were compared with 9 L34 and 12204. The former, which were the first strains from Barberton to be tested at Gatooma, originated from U.4 x Cambodia crosses and back-crosses to U.4; A 292, A 2106 and A 255 were placed among the first four for yield.

The Barberton strains are to be further tested; selection is to be carried out on some of the strains. U.4 x Sea Island and M.U.8 x Tidewater hybrids, seed of which was mostly obtained from Barberton, and the Gatooma U.4 material are also undergoing selection.

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| *Anson, R. R.,*<br>*Knight, R. L.,*<br>*Evelyn, S. H. and*<br>*Rose, M. F.* | *Anglo-Egyptian Sudan. Progress Report of the Plant Breeding Stations, season 1946–1947. (pp. 49–78).* |

Selection work on Egyptian cotton is reported from the Gezira Station, the aim of which is to select high grade stocks of the commercial varieties of Domains Sakel and X1730 for use at Shambat as parents, and to test and if necessary reselect or "filter" in respect to quality the disease resistant cottons bred at Shambat.

Selection and reselection on Domains Sakel included the following. Single plants selected for high yield and high lint index were propagated in progeny rows; some of these appear very promising. Single plants were selected for low node number (6–8) and grown as progeny rows; many selections bred true for low node number. Domains Sakel 1 was refiltered in an attempt to improve regularity; a sample has been submitted for fibre and spinning tests against commercial Domains Sakel and the original D.S.1. A bulk of D.S.2 was grown and filtered. D.S.3 has been obtained by bulking the selfed seed of 44 single plants selected in the previous season; its lint index was 5·4 grm. compared with an index of 5·0 grm. for Domains Sakel. Selfed seed of 14 progeny rows was bulked to form D.S.4. The latter has shown somewhat higher values for seed cotton per boll, lint per boll, seed weight, lint index and ginning out-turn than D.S.

X.1730A was subjected to single plant selection; satisfactory progeny rows are to be bulked to form the first filter. A bulk of X.1730K was grown for filtering. In general characters and lint quality K is superior to A. Bulks of BAR. 1730 L and its selections 1 and 2 BAR. 4/5, BAR. 4/8, BAR. 4/9 and BAR. 4/11 were grown for filtering for higher yield. X. 1530 Hairy is also undergoing filtering; this strain has shown slightly more jassid resistance than X. 1730A and better yield and spinning performance; it is now equal in staple length to X. 1730A.

Selections of Domains Sakel for leaf curl resistance proved significantly more resistant than the control of commercial Domains Sakel.

The following varieties were tested at each of three locations: Domains Sakel D.S.1, D.S.2, X.1730A *ex* Gash, X.1730A *ex* Tokar, BAR. 1730L, BAR. 1730L Sel. 1, BAR. 4/5 and BAR. 4/11. BAR. 1730L appears to be a satisfactory blackarm resistant substitute for X.1730L. If D.S.1 maintains its slightly superior grade and quality, it will probably replace the present conmmercial strain.

The following investigations were carried out at the Shambat Station:—

In the work of transferring the genes of *G. hirsutum* for blackarm resistance from blackarm resistant N.T.2 (*G. barbadense*), previously developed, to Domains Sakel 1, seed of types of genetic constitution $B_1$ $B_1$, $B_2$ $B_2$ and $B_3$ $B_3$ was obtained by the back-crossing technique; this seed is to be sown in small propagation plots during the coming season.

Crosses were made between these blackarm resistant strains and the leaf curl resistant type of Domains Sakel selected at the Gezira Station, as the first step in the work of combining resistance to both diseases. It is mentioned that the work at the Gezira Station has indicated that leaf curl resistance is almost certainly dependent upon a number of minor genes.

A new gene for blackarm resistance, designated $B_4$, has been transferred from *G. sanguineum* (= *G. arboreum* L. race *bengalense* Silow) to Domains Sakel. This gene segregates independently of $B_1$, $B_2$ and $B_3$, and shows an additive effect in conjunction with $B_2$ and $B_3$. It is considered that the technique of doubling the chromosome number of the Asiatic parent by colchicine treatment, then crossing it with Sakel and back-crossing to Sakel on a larger scale is a valuable method of achieving gene transferences from Asiatic types to Sakel.

The variety Grenadine's White Pollen, a perennial *G. barbadense* cotton, has shown marked resistance to blackarm. Crosses of this variety with Domains Sakel and X.1730A reached the first back-cross stage; second back-cross seed was produced for sowing next season. A single major gene appears to govern the resistance of this variety, but its relationship to $B_1$, $B_2$, $B_3$ and $B_4$ is not yet known.

*G. anomalum*, which is almost immune from blackarm, was crossed and back-crossed with a completely susceptible *G. arboreum* type from Java. The resistance of *G. anomalum* is recessive.

Strains of the type X.1730, carrying blackarm resistant genes, have given promising results in spinning tests. BAR. 1730L, carrying $B_2$ derived from Uganda B.31, proved equal to X1730A. BAR. 4/5, with $B_2$ for the same source, was superior to X1730A in standard hair weight and in strength. BAR. 4/11, carrying both $B_2$ and $B_3$, proved superior to X.1730A in length, hair weight and strength.

Work was also carried out on the production of blackarm resistant strains of American Upland. A small propagation plot of BAR. SP.84, homozygous for both $B_2$ and $B_3$ was grown. Seed of Uganda B.P. 52 homozygous for $B_2$ was produced.

*G. Thurberi*, *G. armourianum* and *G. somalense* showed marked resistance to pink bollworm (*Platyedra gossypiella*) and Egyptian bollworm (*Earias insulana*). In this connexion it is interesting to note that the first two species have woody bolls, whereas *G. somalense* has bolls of paper thinness. *G. anomalum* appears to be resistant to pink but susceptible to Egyptian bollworm; for *G. Raimondii* the reverse appears to be the case. The attempt is being made to transfer the bollworm resistance of *G. Thurberi* and *G. armourianum* to Domains Sakel and American Upland cottons. The work has reached the second back-cross stage. *G. "thurbadense"* (= *G. Thurberi* x D.S.) and *G. "armadense"* (= *G. armourianum* x D.S.), produced by colchicine doubling, were the first steps in this work.

The gene for hairiness in Carpulla has been found to occupy the same locus as $H_1$, the gene for hairiness in Tangüis; both genes have now been transferred to Domains Sakel. The transference of reasonably good density and length of hair to Sakel from M.U. 8b and Ferguson is also receiving attention.

Deciduous bractlet is inherited as a recessive character, in transferences within American Upland cotton and from this cotton to Sakel. It appears that unfortunately this character is associated with abnormal leaves, boll shedding and possibly a reduction in boll size.

The transference of the character of "short branch" in Egyptian cotton and of the "cluster" character of an Upland cotton to Domains Sakel is in progress.

A seedling of *G. Davidsonii* x Sakel, so far a sterile shrub, has been obtained by soaking hybrid seed in 0·05% colchicine solution for 48 hours.

The $F_1$ of tetraploid Wagad 8 (*G. herbaceum*) x Sakel has been successfully back-crossed to Sakel.

Tetraploid "Multani" (*G. arboreum*) was crossed with Domains Sakel; first back-cross seeds have been secured.

The cross *G. anomalum* x Domains Sakel is being treated with colchicine to produce the hexaploid *"G. anomalense."*

The Kadugli Station is concerned with the improvement of American Upland cotton. Selection of BAR.NT.205, lots from Nyasaland and BAR.SP.84 is reported.

The main variety trial carried out at Kadugli comprised BAR.SP.84, BAR.NT.205/43, BAR.NT.96/40 and the control Pump Scheme Strain. A trial of BAR.SP.84, N.T.205/42 and the control P.S.S. with two spacings is also reported.

The development of blackarm under conditions at Kadugli was studied in the following: BAR. 13/1, carrying $B_2$ and $B_3$ on the background of 511D, the latter being derived from Uganda S.G.85; susceptible SUS 7/2 *ex* S.P. 84R; and BAR.SP84, carrying $B_2$.

Selection of sorghum and cowpea is also in progress at Kadugli.

The groundnuts Barberton, an upright type, and Beladi Local, a runner type, were tested on the black cracking clay soils of the Nuba Mountains. As a result, upright types of groundnut are recommended for heavy clay soils.

White and red seeded strains of simsim (*Sesamum indicum*) are to be planted in an attempt to develop non-shattering types resistant to the local disease "marad ed dam".

*Manning, H. L.* — *Uganda. Cotton Experiment Stations, Kawanda and Serere. Progress Reports for the season 1946–47. (pp. 79–101).*

In breeding for blackarm resistance at the Kawanda Station, back-cross material of B.P. 52 carrying $B_2$ from B.181 or a derivative of this cotton, and of B.P. 52 carrying $B_3$ from Gambia native cotton, was grown.

The mode of inheritance of the *Verticillium* wilt resistance known to exist in B.181 is under investigation.

The work of transferring the characters of okra leaf, tomentose hairs, and naked and tufted seed to B.P. 52 is in progress.

B.P. 52 strains are being subjected to selection.

Seed of B-C. 66 has been released to the seed farm for multiplication. The strain has a fairly high degree of blackarm resistance. In spinning performance it has proved at least as good as commercial B.P. 52.

Varietal trials conducted at 11 centres in Buganda are reported. The results indicate that B.181 has no advantage over B.P. 52 apart from its blackarm resistance, except under conditions of relatively high fertility.

Tests of strains of the varieties N.17, B.181 and B.P.50 were carried out at the Serere station. District variety trials are also reported; the results show that for the season under review, N.17 and its derivatives possess cropping capacities equal to those of selections of Buganda local, including S.5301 and S.5302.

*Prentice, A. N. and Bebbington, A. G.* — *Tanganyika Territory, Lake Province. Ukiriguru and Lubaga Experiment Stations. Progress Report for the season 1946–47. (pp. 102–15).*

The strain mixture U.K.46 developed in the Lake Province outyielded commercial Mz.561 by an average of 25% in 17 trials; superior jassid resistance was doubtless the main cause of the superiority of U.K.46. Blackarm resistance is one of the chief aims in developing the new strains mixture U.K.48 which is to follow U.K.46. In the work on blackarm resistance, assistance is being given by the Shambat Station, Anglo-Egyptian Sudan.

The results of tests of N.U.8, and derivatives of crosses between M.U.8 and U.4 and between U.4 x Cambodia from Barberton, and other cottons are briefly summarized.

In the Eastern Province a trial of the following varieties was repeated: Eastern Province Local; Uganda B.P.52; M2.561; B38/9, a selection of Eastern Province Local; and M.U.8A, a selection from Malwa Upland. Trials of five selections from Eastern Province Local in comparison with B.P.52 and E.P. Local as controls are also reported. Further selection of E.P. Local and Sea Island x U.4 crosses from Barberton is being carried out.

*Ducker, H. C., Hoyle, S. T. and Miller, W. L.* — *Nyasaland. Cotton Experiment Station. Domira Bay Station. Progress Report 1946–47. (pp. 116–26).*

Variety trials included Crown Land 20–30, C.L.20–34, C.L.20–46, B.181, T.22 (derivative of M2.561) with C.L. bulk as control.

Further selection of C.L.20 and T.22 is reported. Useful selections of B.181 were obtained. No new crosses were made. Observations were carried out on two new introductions from Uganda, viz., B.C.66, a B.P.52 x B.181 back-cross, and H.78, a cross between B.P.52 and N.17. Crosses made last year involving B.181 were grown as $F_1$ generations. Hybrids introduced from Uganda were subjected to single plant selection. Selfed and natural bulks of all the crosses in hand, including A.2208 (M.U.8 x U.4) from Barberton, are available for further work in the 1947–48 season.

The new introductions also included Brazilian varieties and the Indian cottons M.U.8A and M.U.8B.

Local varieties and strains, and the Sudan cottons BAR.7 1, BAR. 12 1, SUS. 7/2 and SUS. 12/2 were tested for blackarm resistance by the technique of spraying developed by R. L. Knight at the Shambat Station. The results suggest that the development of lesions as seen in the Sudan is inhibited under Nyasaland conditions. Blackarm did not appear to be a factor limiting cotton production in the season in question; the susceptible and resistant types from the Sudan are to be tested for yield in the coming season.

*Nigeria. Progress Report on cotton growing in Northern Provinces for the season 1946–47. (pp. 127–32).*

Strain Samaru 26c was multiplied up at Daudawa, Northern Nigeria.

Varietal trials were carried out at Daudawa and Samaru; no significant differences in yield were recorded.

Selection of Ishan A at Ibadan, Southern Nigeria, was continued.

*Lochrie, J. V.*
*Harper, A. S. and*
*Nanton, W. R. E.*

*West Indies. Cotton Experiment Stations. (pp. 133–52).*
*Cotton Experiment Station, Antigua. Progress Report for the season 1946–47. (pp. 137–43).*
*Cotton Breeding Station—Montserrat. Progress Report for the year 1947. (pp. 144–48).*
*Progress Report on the cotton breeding work at Camden Park Experiment Station, St. Vincent, for the season 1946–47. (pp. 149–52).*

At the Camden Park Experiment Station, St Vincent, the maintenance of the superfine strain V.135 continued. Selection work on VH. material, derived from crosses between V.135 and M.S.I., is now confined to derivatives with high spinning value. The VH. strains have higher yielding capacity than V.135, and some of them are equal to V.135 in spinning performance.

Maintenance of the Sea Island Type Collection continues at the Antigua Cotton Station. Environmental influence on the quality of M.S.I. is to be investigated.

Work at the Montserrat Cotton Station has been concerned with the improvement of the M.S.I. strain. This strain is now very uniform, and selection work is confined to maintaining purity and quality, and to providing nucleus stocks for the other islands. Selection of the families M.4601, M.4602, M.4611 to M.4617, and M.4619 is reported, also a small bulk trial of selections from these families.

2331.
633.51:575
633.51–1.524
633.1:575
633.854.54:575

TURGAY, N.
Tarim Bakanliği Bünyesinde Pamuk Işleri Müdürlüğü vazife ve teşkilâti.
**(Objectives and organization within the framework of the Department of Agriculture of the Cotton Investigation Department).**
T.C. Tarim Bakanliği Dergisi 1947 : **1** : No. 3 : 18–19.

In 1937 a Department for Cotton Investigation was set up under the direction of the Turkish Minister of Agriculture for promoting cotton cultivation. At present there are two parent institutions at Adana and Nazilli, two branches at Eskişehir and Malatya and, this year, a breeding farm was opened at Manisa, besides various farms dependent on the parent institutes.

From 1931 onwards, improved cotton varieties, imported from the U.S.A., were given comparative trials; at first, Cleveland in the northern province and Acala in the Aegean district, gave the best results and, accordingly, the sowing of these varieties was made compulsory and the old open-bolled cotton varieties were prohibited.

In 1939 tests with seed, also imported from the U.S.A., showed that Acala gave the best results in the northern district also, and from 1943 onwards the Cleveland variety was also suppressed. The regions formerly growing open-bolled cottons changed over to Acala, and trials were continued on this variety and also on some of the native close-bolled cottons.

From 1935 to the present time, 5880 tons of pure seed of Cleveland and over 8000 tons of Acala have been distributed.

Systematic investigations on native cottons have given favourable results and a new high-yielding native variety, with good quality fibre, has been launched under the name of Y.193*. As was done with Acala, in order to raise the standard of purity and quality of the seed reserves from improvement experiments, the earlier maturing and higher yielding types were set apart and tested for breeding purposes. Special cotton selector machines were imported from U.S.A. and set up at the main centres; the purity of a great quantity of cotton seed was improved by passing through these machines.

Besides cotton, research was carried out on cereals, flax, hemp, sesame and castor bean, and new high-yielding types were introduced; among them are Topak, Karakilçik and Floransa wheats, a barley variety A. (Arpa 17) and a linseed of Argentine origin. N.I.

2332. 633.51:575(47)
633.2/3:575(47)

Naučnyĭ Otčët Azerbaĭdžanskogo Naučno-issledovateljskogo-Hlopkovogo Instituta za 1941–42 gg. (**Scientific Report Azerbaijan Cotton Research Institute for 1941-42**) Moscow 1946 : Pp. 135.

(*I. Breeding and seed production of cotton and forage plants*). (*pp. 7–21*).

An outline is given of cotton breeding by the Azerbaijan Research Institute for Cotton since 1926, of the methods used and of the performance of the varieties obtained in various trials in Azerbaijan.

Of the Upland cottons bred, the varieties 01298, 01455 and 01508 did well in trials. In economic qualities, 01298 surpassed both its parents and the medium early variety 114 as well, and also showed some resistance to gumming disease and wilt. The varieties 01455 and 01508 were outstanding in length of lint and resistance to wilt, and 01508 had also the largest bolls of all early varieties tested and was highly resistant to wind damage.

The most promising Upland cottons bred are 0155 and 01363; both are wilt resistant and of good quality, nearly equalling the best variety 0246 in the quality of yarn.

In the recent years hybridization, including pollination with mixed pollen from several varieties, has been employed mainly to obtain early varieties. Parents have been obtained from various regions and promising material for breeding new early Upland cottons for Azerbaijan is available.

Imported Egyptian Fuadi cotton became impure and, after a botanical study of the typical and off-type forms, élite seed, breeding was adopted to regain purity. At the same time breeding was begun for improved yield and disease resistance and for earliness combined with the Fuadi type of lint. Among the resulting varieties 2966–1 (from Giza 7) and 4768 (from 910 and 12) are mentioned for their earliness and superiority to commercial Fuadi, as regards yield and other economic qualities. The variety 2966-1 is also highly resistant to virus disease, more resistant than Fuadi to gumming, and also tolerant to unfavourable conditions, though it cannot entirely replace Fuadi as its lint is too long.

The variety 4768–1 has proved in Azerbaijan to be the highest yielding Egyptian cotton tested and is 3–4 days earlier than Fuadi. It is also resistant to virus disease and owing to its compact habit does not suffer from shedding of the lint. It is suitable for mechanical harvesting. In lint quality it resembles Fuadi but has somewhat longer fibres and a lower metric number.

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* Y=Yerli=native.

Other promising lines are: 4907–2, 928–27, 4825–5, M825–5, M78, M130, D515 and D522 and the hybrid lines Az1, Az10, Az31, Az29 and Az69; their investigation is still proceeding. Good results are also expected from crosses of the best Egyptian commercial and bred varieties.

In 1932 the breeding of Sea Island cottons for yield and adaptation to Azerbaijan conditions was begun, the main method being hybridization of Sea Island varieties with early Egyptian cotton. One variety $377_1$, obtained by individual selection from hybrids of Fuadi crossed with Sea Island x Sakel 494, resembles the Egyptian cottons in yield and has the Sea Island lint quality. Its bolls are large and the lint is very uniform, but insufficiently reliable in regard to strength. It is also subject to virus.

Another variety Si 12, obtained by hybridization from Fuadi 928 and Sea Island No. 1, is high yielding and has stronger lint than $377_1$, averaging 4·4 grm. In trials from 1940 to 1942 both varieties had lint 47–49 mm. and more in length. Si 12 is considerably more resistant to virus than $377_1$.

Other promising varieties still undergoing trials are: Si 14 which had the largest bolls of all the Sea Island cottons bred; and Si 85 and Si 95 which are high yielding and have good strong lint.

Breeding and seed production work carried out with fodder plants is also mentioned with observations on methods and the criteria applied to the selection of élite material. Supplementary artificial pollination of lucerne increased yields by 38·1%. The method is simple and could be used in practice, and was effective also with sainfoin.

The best varieties of herbage plants released for large scale production included the following:—

The lucerne No. 262, derived from Arabian lucerne, in most regions surpassed other varieties in yield. Early spring growth, late dying off in the autumn and adaptation to low temperature and to regions with a poor water supply are among its most valuable features.

Sainfoin is represented by two varieties of local origin, No. 18, from the Armenian Republic, and No. 74 from the Nahičevan Autonomous Republic. Both showed good yields and are useful for poorly watered regions.

*Trifolium resupinatum*, an annual herbage plant valued for its high yield of seed and hay, is bred only at the Azerbaijan Research Institute for Cotton. The best varieties were obtained by repeated selection from a population of Iranian origin and from hybrid varieties resulting from natural crossing of a local wild *T. resupinatum* from Lenkoranj and cultivated Iranian varieties. The hybrid varieties were noted for exceptionally high seed production. The resistance of *T. resupinatum* to rust and black spot has been greatly increased by breeding. The original Iranian population suffered from both maladies.

A collecting expedition to Armenia, organized by the Cotton Research Institute, yielded promising species of fescue and *Dactylis glomerata*.

(*III. Food and technical crops. Sugar beet in Azerbaijan*). (*pp. 47–85*).

Sugar beet is dealt with from the standpoints of growth and development, time of sowing and lifting, irrigation, storage and seed production.

The following information concerns legume cultivation in the cotton growing regions of Azerbaijan.

The breeding of winter peas was carried on from 1929 to 1939 with an initial collection of 576 specimens from the Institute of Plant Industry, of which 25 that survived the winter of 1929–30 were used for mass selection and hybridization. The many new record-breaking winter hardy varieties for fodder and green manuring are mostly of hybrid origin and have small, dark coloured seeds. Selection has been based mainly on winter hardiness and yield of green matter. The variety No. 462 was released for use as green fodder, silage, hay or green manure.

The possibility of using winter hardy fodder peas for human food was also examined.

The most promising varieties as regards seed yield and winter hardiness were Nos. 468, 1528, 1508 and Alžirskiĭ [Algerian]. Their origins and agronomic features are set out. No.

1508 was derived from *Pisum sativum* spp. *asiaticum* (from Afghanistan x *P. sativum vulgare*, and No. 1528 from *P. sativum vulgare* (from Asia Minor) x *P. arvense* (from America). Cookability and flavour were also determined.

Owing to their time of ripening and small seeds winter hardy varieties were resistant to *Bruchus pisi*.

Advantages of *Lathyrus sativus* as compared with the winter pea include greater winter hardiness and immunity to *Bruchus* sp. and aphis. For future breeding work a larger selection of local forms are required for study on the plains.

*Cicer arietinum* was found to be unpromising as a crop for the Azerbaijan cotton zone as all the material tested proved susceptible to pest attack.

The winter variety No. 131 of *Vicia Faba* from the Institute of Plant Industry showed exceptional winter hardiness and good cookability and average flavour. Its yield was 9·2 c. per ha. For future selection work material from Taljšč and other regions growing *V. Faba* should be collected.

Problems of spring sowing of legumes (e.g. peas, soya bean, *Cicer arietinum*, lentils, *Lathyrus sativus* and *Trigonella*) under the conditions of the Azerbaijan cotton zone are briefly considered in relation to records of performance of the various crops. The introduction and breeding of high yielding varieties and types of lentil are necessary.

In 1942 the Scientific Research Institute for Cotton made a study of a collection of sugar and grain sorghums and a promising collection of varieties resulted. The performance is noted of sorghums from Australia, U.S.A., Egypt, and a local sorghum, Ak-dara, recommended for its quality. Promising varieties of sugar and grain types were being multiplied up at the Institute in 1943.

Experiments on millet to compare the effects of sowing time on the yield of different varieties included some Russian millets. Veselyĭ Podol 24/273 and Saratov 853 gave the best yields.

A new method, attributed to Lysenko, of preparing potatoes for sprouting is based on the results of experiments on the removal of varying amounts of the rose end of the tuber. The method proved applicable to old as well as fresh tubers.

*Protection of plants from agricultural pests and diseases*). (*pp. 86–118*).

Many years' study of disease resistance of varieties of cotton showed that selection was giving promising results and that it should be possible to breed varieties resistant to gumming, virus and wilt. The most promising varieties as regards wilt and gumming resistance are mentioned.

Experiments not yet complete suggest that virus disease can be transferred from Egyptian to American cotton.

Observations on the varietal susceptibility of potatoes to crinkle indicated the need for breeding for resistance by individual selection.

Agronomic factors in resistance were also studied.

2333. SARAIYA, R. G. 633.51:575(54)

**Indian Central Cotton Committee. Its past performance and future needs.**

Indian Cott. Gr. Rev. 1948 : **11** : 47–53.

An account is given of the improvement in various cottons achieved by the Committee since its formation in 1926; and future objectives are outlined.

2334. 633.51:575(62)

**Summary of the visit of Mr D. N. Mahta, Secretary Indian Central Cotton Committee, to Egypt and the United Kingdom.**

Indian Cott. Gr. Rev. 1948 : **11** : 54–72.

An account is included of cotton varieties in Egypt, the improvement work of the Cotton Research Board, the seed maintenance system, pest and diseases, the tests carried out at the Spinning Test Mill and Technological Laboratory of the Research Board, and other aspects of cotton production in Egypt. An account is also given of the visit to the Shirley Institute, Manchester.

2335. WESTBROOK, E. C. 633.51:575(75.8)
**Our one-variety cotton improvement program.**
44th Proc. Ass. Sth. Agric. Wkrs. Miss. 1947 : 96–97.

A brief account is given of the practical results of the cotton improvement programme in Georgia, which since 1931 has aimed at greatly reducing the number of varieties grown.

2336. SILOW, R. A. 633.51:575.113.7
**The taxonomic distribution of the complementary lethal 'crumpling' genes in Asiatic cottons.**
Indian J. Genet. Pl. Breed. 1946 : **6** : 1–4.

The semi-lethal or lethal abnormality known as "crumpled" occurs in *Gossypium arboreum* and *G. herbaceum*, and depends upon two complementary genes designated $CP_a$ and $Cp_b$ (cf. *Plant Breeding Abstracts*, Vol. II, Abst. 547, Vol. X, Abst. 490). A table is given summarizing the taxonomic distribution of the genes $Cp_a$, $cp_a$, $Cp_b$, $cp_b$ in the two species, based upon a survey of the Trinidad Type Collection, and incorporating data from 31 strains tested by Hutchinson in 1932 (cf. *Plant Breeding Abstracts*, Vol. II, Abst. 547) and four studied later by Nath and Govande (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 44). The evolutionary significance of the lethal mechanism is discussed; the complementary genes for "crumpled" are considered to have played only a subsidiary role in the evolution of *G. arboreum* and *G. herbaceum*.

In an unpublished communication Stephens has concluded that the hypothesis of compleplementary alleles at a single locus postulated by him for the character of "corky" (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1075) is also applicable to the character of "crumpled". The present author suggests future lines of investigating whether "crumpled" is due to complementary alleles at a single locus or complementary genes at single loci. Linkage studies in diploid Old World cottons involving easily scored characters are recommended.

2337. BROWN, M. S. 633.51:576.356:575.11
**Asynapsis in the progeny of a monosomic plant of cotton.**
Genetics 1948 : **33** : 97–98. (Abst.)

The progeny of a monosomic plant with quadrivalents included a number of sterile plants which were found to have 52 univalents at meiotic metaphase, multipolar spindles at anaphase and numerous microspores in the tetrad stage. The monosomic plant included the variety Coker 100 (*Gossypium hirsutum*) in its parentage. It is thought that these sterile plants may have received the gene for asynapsis, known to occur in Coker 100, in triplicate or quadruplicate as a result of irregularities in chromosome segregation.

2338. HEIBA, A. S. 633.51:581.49
**Multicellular hairs in *Gossypium*.**
Science 1948 : **107** : 650–51.

The results of a study of the development of the seed hairs of Upland cotton are summarized. The initiation of both the lint and the fuzz hairs is independent of pollination and fertilization.

2339. AFZAL, M. 633.51:581.6:575(54)
**Problems in cotton improvement in the Punjab. III. Improvement in ginning outturn and staple length.**
Indian Cott. Gr. Rev. 1948 : **11** : 73–83.

The result of selection for higher ginning out-turn in the Punjab is described, with reference to the desi variety M. 60 A2 and Punjab-American cottons. Work on improvement of staple length is also outlined. The local desi cottons show practically no variability in staple length, the possibility of improving this character by selection thus being negligible. Hybridization has therefore been carried out, and the Jubilee strains have been produced by crossing 39 Mollisoni with Chinese Million Dollar in 1930. Jubilee strains have been crossed with *Gossypium anomalum*, and subsequently back-crossed to Jubilee. As a result of this work, desi strains are now available which equal the Punjab-American cotton 4F in spinning performance. These strains are to be tested in different parts of Western Punjab, so that suitable strains may be selected for the different tracts; and it is hoped that in the near future no desi cotton of spinning performance of less than 20's will be grown in this region. Cottons with the high quality of Egyptian types will however never be acclimatized in Western Punjab. The only way in which cottons with a staple of $1\frac{1}{4}$ inches and over can be produced is to import biotypes from Central America for use in breeding work. The following work has been begun with a view to increasing staple length: (1) acclimatization of long-linted American varieties; (2) selection for long lint among the local American varieties; (3) hybridization of local American varieties; (4) hybridization of local American varieties with exotic long-linted *G. hirsutum* types; and (5) hybridization of progenies from (2) and (3) with exotic long-linted *G. hirsutum* cottons. This work was only begun four years ago, and therefore final results are not yet available. But good progress has been achieved, and it is hoped that American cottons with a staple length of $1\frac{1}{8}$–$1\frac{1}{4}$ in. will shortly be available.

2340. Fielding, W. L. 633.51:581.6:575:578.08(68)
**Experimental methods with cotton. V. A study of ginning percentage and its determination in variety trials.**
J. Agric. Sci. 1948 : **38** : 154–57.

Methods of obtaining samples of seed cotton in the field for the determination of ginning percentages in strain trials have been studied at Barberton, South Africa, using a wide range of strains derived from the jassid resistant Upland cotton U.4. The taking of samples as the bulk picking from each plot is brought to the scale for weighing has been found to be the most satisfactory method of collection. A sample size of 200 grm. has proved sufficient. Although the variation in ginning percentage has been found to be small, it is still considered advisable that the ginning sample should be representative of all the plants of a strain.

2341. Fielding, W. L. 633.51:581.6:575:578.08(68)
**Experimental methods with cotton. VI. The determination of staple-length in single plant selections and variety trials.**
J. Agric. Sci. 1948 : **38** : 158–62.

A report is given of investigations carried out at Barberton on measuring the staple length of cotton strains by the "butterfly", "halo" and "maximum halo length" methods, the comparative accuracy of three persons' measurements by these methods, and of the number of seeds which should be measured in order to achieve various degrees of accuracy in the determination of differences in staple length between strains and single plant selections.

2342. Iyengar, R. L. N. 633.51:581.6:578.08
**A new balance for the rapid determination of the ginning percentage of a sample of seed cotton.**
Indian Cott. Gr. Rev. 1948 : **11** : 84–88.

A balance is described by means of which ginning percentages of 25–45% can be rapidly determined. The balance is suitable for use in field laboratories and should meet the requirements of cotton breeders satisfactorily.

2343. Berkley, E. E.,
Woodyard, O. C.,
Barker, H. D.,
Kerr, T. and
King, C. J. 633.51:581.6:578.08:575
**Structure, determined by X-ray, and strength of cotton fiber.**
Tech. Bull. U.S. Dep. Agric. 1948 : No. 949 : Pp. 64.

An account is given of the X-ray diffraction technique for the study of cotton fibres. The method is valuable in cotton breeding and general fibre research. In cases where field damage has occurred the X-ray angles may be more reliable indices of genetic characteristics and potential fibre strengths than the Pressley values and the Chandler bundle strengths.

2344. Sturkie, D. G. 633.51:581.6:581.02(76.1)
**Effects of some environmental factors on the seed and lint of cotton.**
Bull. Ala. Agric. Exp. Sta. 1947 : No. 263 : Pp. 87.

A report is given of experiments carried out by the Agricultural Experiment Station of the

Alabama Polytechnic Institute to determine the effect of various environmental factors upon the properties of the seed and lint of cotton. The following experiments are reported: (1) a study under controlled conditions to estimate the effect of variables of soil moisture, soil type, preparation of soil, fertilizers and organic matter upon the seed and lint properties of a pure line strain of Mexican Big Boll; (2) an experiment to study the response of Mexican Big Boll, Stoneville 5A, Clevewilt strain 5 and Cook 1006 to different conditions of soil moisture; and (3) a test of the effect upon the properties of several commercial cottons under different conditions of fertilization, preparation of soil, location and picking date.

2345. WEINDLING, R. 633.51–2.3–1.521.6:578.08(73)
**Bacterial blight of cotton under conditions of artificial inoculation.**
Tech. Bull. U.S. Dep. Agric. 1948 : No. 956 : Pp. 59.

A detailed account is presented of investigations on bacterial blight of cotton, in which particular attention was given to (1) fundamental host-parasite relationships in epidemics of the disease, involving intensive studies on the infection of individual leaves, and (2) methods of producing epidemics by artificial inoculation under greenhouse and field conditions in relation to varietal resistance and epidemiology.

2346. SMITH, A. L. and
BALLARD, W. W. 633.51–2.484–1.521.6:575.42(76.1)
**Wilt resistance in Empire cotton.**
44th Proc. Ass. Sth. Agric. Wkrs. Miss. 1947 : p. 187.

Wilt resistant lines of Empire have been selected in Alabama. The wide range in reaction to this disease shown by the selfed progenies indicates the heterozygosity of the original plant from which Empire was developed, and suggests the probable origin of this variety from a cross between Stoneville 2 and a wilt resistant cotton.

2347. COTTON, J. R. and
NEAL, D. C. 633.51–2.484–1.521.6:575.42(76.3)
**Improving wilt resistance and yield of cotton by roguing and selection.**
44th Proc. Ass. Sth. Agric. Wkrs. Miss. 1947 : p. 21.

It is noted that wilt resistance has been raised from 35% to 98% in two strains by selecting the original strain under severe conditions of natural wilt infection at Baton Rouge, Louisiana.

2348. MILLIKAN, C. R. 633.52–2.421.9–1.521.6(94.5)
**"Pasmo" disease of flax.**
J. Dep. Agric. Vict. 1948 : **46** : 90–92.

The reactions of a large number of flax and linseed varieties to *Sphaerella Linorum* in tests carried out in Victoria during 1944 and 1945 are reported.

The variety Bison proved to be resistant, a result that agrees with the work of American investigators. Severe lesions, however, developed on stems of Bolley's Golden. Linseed varieties from Egypt and India were particularly susceptible.

2349. GRENTE, J. 633.52–2.482–1.521.6(44)
Etude du mort-lin. (**Study of flax blight**).
Ann. Epiphyt. 1946 : **12** : 325–46.

Experiments showed that the flax variety Bison III was very susceptible to *Ascochyta linicola* while Blenda was fairly resistant and Concurrent almost entirely so. It is possible that the new varieties derived from Concurrent will have even greater resistance. *A. linicola* is thought to be the organism chiefly responsible for flax blight, other contributory agents being *Fusarium* species, *Asterocystis radicis* and various bacteria.

2350. BATALLANEZ, R. H. 633.52–2.483–1.521.6(82)
Presencia de la "antracnosis" del lino en la Republica Argentina. (**Presence of anthracnose of flax in the Argentine Republic.**)
Publ. Minist. Agric. Nación Argentina 1947 : No. 23 : Pp. 34.

*Colletotrichum Lini* (West) Tochinai has been detected in Argentina. Details are given of the reaction to it of a series of Argentine fibre and oil flaxes.

2351. GRANHALL, I. and 633.52.00.14(48.5)
LARSSON, N. G. 633.522.00.14(48.5)
Odlings- och beredningsförsök med spånadsväxter under år 1946.
**(Cultivation and processing trials with fibre plants 1946).**
Medd. LantbrHögskolan Jordbruksförsöksanstalt., Stockholm 1948 : No. 22 : Pp. 48.

The field trials here recorded are concerned with the following problems of flax and hemp cultivation: the effects of manures, time of sowing and harvesting, rate of seeding, weed control, and method of flax pulling.

Variety trials are also recorded; they included Dutch and Irish varieties and the Swedish flaxes, Sv. 041 $b_2$, and Sv. 0800 which has given promising results.

The most advantageous time for harvesting in the hemp trials proved to be about 15 days after the male plant has flowered.

2352. GURŽIĬ, E. S. and
KAPLINOVA, R. I. 633.522(47)
**(The best local varieties of hemp in the eastern regions of the U.S.S.R. and the limits of their distribution).**
Naučnyĭ Otčët Vsesojuznogo Naučno-issledovateljskogo Instituta Konopli za 1941–42 (Sci. Rep. All-Union Sci. Res. Inst. Hemp for 1941–42) 1944 : 3–8.

An investigation has been made of the local hemps cultivated in the various hemp growing areas of the U.S.S.R.; the variety Počinki No. 42 was used as standard and ripened in 108 days; 13 of the 29 samples tested ripened earlier than the standard, the earliest being the hemp from the Komi Autonomous Republic, which ripened in 79 days; it was also more vigorous than the best plants of the standard in the early stages. In all varieties from northerly and easterly districts the male plants were 1 to 35% lower than the female plants. The Komi variety had the least length of unbranched stem and the lowest number of leaf lobes. The greatest length of unbranched stem (126–148 cm.) was observed in the forms from the Novgorod, Tartar and Altai regions, the greatest fibre yield in the Altai, Kuĭbyšev and Tartar regions and the lowest in the Komi forms.

2353. ZAGORODNJAJA, O. P. 633.522(47)
**(Variety testing in hemp breeding at the Počinki Experimental Field in 1942).**
Naučnyĭ Otčët Vsesojuznogo Naučno-issleldovateljskogo Instituta Konopli za 1941–42 (Sci. Rep. All-Union Sci. Res. Inst. Hemp for 1941–42) 1944 : 28–36.

Observations were made on eight varieties of Russian hemp in respect of such characters as ripening time, plant height and yield of fibre and seed. A variety from Novozaimsk in the Omsk province proved equal to the standard, Počinki hemp, in yield of stem and seed and was earlier in maturity. The Altai hemp surpassed the standard in yield of fibre but ripened later.

The earliest and most productive of the southern hemps was Ferralonia No. 122. The best seed yield was given by the Tušnur hemp from the Mari Autonomous Republic.

2354. KANISKIN, M. F. 633.522:575(47)
**(Hemp varieties of the Penza area).**
Naučnyĭ Otčët Vsesojuznogo Naučno-issledovateljskogo Instituta Konopli za 1941–42 (Sci. Rep. All-Union Sci. Res. Inst. Hemp for 1941–42) 1944 : 36–39.

The variety SOU, which has been tested for three years, has proved superior to the local hemp in fibre quality, and its yield of long fibres was 60·9% higher; it ripens in 119 days against 112 for the local hemp.

2355. Lihvarj, D. F. and
Arinšteĭn, A. I. 633.522:575(47)
(**Breeding high yielding varieties of southern hemp for the north-eastern areas of the U.S.S.R.**)
Naučnyĭ Otčët Vsesojuznogo Naučno-issledovateljskogo Instituta Konopli za 1941–42 (Sci. Rep. All-Union Sci. Res. Inst. Hemp for 1941–42) 1944 : 9–27.

Selection of the high quality Italian hemps for earliness has invariably led to a reduction in height and selection for height has led to a reduction in earliness. In 1940 a new approach was adopted, consisting of sowing a month or more after the normal date, seed of the same sample being sown at the normal date as a control. The seeds from the late sowing gave rise to plants that ripened three to four days earlier and were taller than those from the late sowing.

Data on the correlation between fibre content and morphological features such as the ratio of length of stem to diameter showed that such features could be used as selection criteria only within populations consisting of plants of more or less uniform height. Between height of plant and seed yield a correlation coefficient of + 0·40 ± 0·30 was established, whereas between fibre content and seed yield the correlation was − 0·28 ± 0·03, and between fibre content and thickness of the woody layer it was − 0·31 ± 0·16.

The above and other characters were used as selection criteria in breeding work aimed at producing an early maturing form of the Ferralonia hemp started in 1939. After four years' selection a reduction of 18–20 days in vegetation period was achieved, although this was accompanied by a slight reduction in height and fibre content; the seed yield was however increased. Selection No. 122 was only 10–12 days later than the local hemp of the Počinki area in the Gorjkov province, which it exceeded by over 30% in yield of stems.

Selection of Japanese hemp was directed towards increasing the height of stem, reducing its diameter and woodiness, and reducing the difference in ripening time between the male and female plants. By selection in this way the stem length was increased from 192·4 to 234.6 cm., the thickness of the wood was reduced from 20·50 to 17·67% of the diameter and the seed yield raised from 0·3 to 3·48 c. per ha., without any deterioration being observed in other characters. The new selection ripened later in the Gorjki area and was suitable for fibre but not for seed production, but at Gluhov in the Sumi province it ripened only 5 to 14 days after the local hemp and flowered sooner than the Ukrainian variety Ju S-1. It is also more resistant to the flea beetle than most other varieties.

2356. 633.522:581.44:575.243.061.6
Hoffmann, W. 633.522:581.162:577.8
Helle Stengel—eine wertvolle Mutation des Hanfes (*Cannabis sativa* L.).
[**Light coloured stems—a valuable mutation of hemp (*C. sativa* L.)**].
Züchter 1946 : **17/18** : 56–59.

An early ripening Finnish hemp was crossed with a late ripening Italian hemp. In the $F_2$ and $F_3$ generations a mutant appeared, in which, just before flowering, the stems became a light waxy yellow colour and the leaves were of a slightly lighter green than is normal; the vitality of the mutant plants was only slightly below normal. Back-crossing proved the character of light stem to be recessive and monofactorially inherited. By sib-crossing this mutation was reproduced in the next generation and by isolation could be bred pure.

The $F_2$ progenies, produced by crossing ♂ plants having wax yellow stems with normal green ♀ plants from a strain of simultaneously ripening hemp, showed independent segregation of the genes for the sex types and the factor for light stem; moreover, a combination of this character with the monoecious condition or with simultaneous ripening of both sexes has been achieved, a fact of importance in further utilization of this character in breeding.

Though the selected lines of this light stemmed mutant are not sufficiently vigorous or high yielding owing to their early ripening, they are valuable material for hybridization. By selection the fibre yield could be increased by about 24%.

Other varieties, which have already been bred, allow of machine harvesting, without previous removal of the male parents and without loss of quality in the fibre; but the colour of the fibre is spoilt owing to the omission of bleaching in the field. In the case of the light stemmed mutant bleaching would be unnecessary. E. W.

2357. NEUER, H.,
PRIEGER, E. and 633.522:581.6:578.08(43)
SENGBUSCH, R. v. 633.522:575(43)
Hanfzüchtung. (**Hemp breeding**).
Züchter 1946 : **17/18** : 33–39.

Direct and indirect methods of testing individual plants for fibre content and fibre yield are described, also the authors' microscopic method, which can be applied to large amounts of material to determine the content of bast and fibre and their structure in individual plants to be used subsequently for seed production. Seeds of individual plants found to be richest in fibre are then submitted to mechanical separation to obtain only the highest grade of fully mature seeds. The work in the breeding, multiplication and test plots is shortly described. E. W.

2358. 633.522–1.531.12:578.08
633.522:581.48:575.061.6
CRESCINI, F. 633.522:581.162:575"793"
Formen von Hanf (*Cannabis sativa* L.) [**Forms of hemp (*C. sativa* L.)**].
Züchter 1940 : **12** : 105–15.

A new isolating bag is described. It was used to overcome the difficulties of isolating hemp types from ordinary populations in the Emilia hemp growing districts. Having isolated the parents, the seed, mainly of hemp from Carmagnola (Turin), was multiplied by inbreeding and used for further experiments and in breeding. Some forms were obtained which had striped stems, this character being inherited recessively. As regards the mean weight of 100 seeds, types were classified as macrosperm, mesosperm and microsperm, some of which bred true. In some populations studied there were also marked differences in the shape of the seeds and some forms isolated differed from each other in the colour of their seed; these were multiplied for future work on seed colour, as a criterion for judging hemp seed. In applying this method, it is essential that the harvest should have ripened completely and under normal conditions. A variable character of hemp seed apparently so far overlooked is the pigmentation of the hypocotyls of hemp plants exposed to daylight. The colours developed in the hypocotyls of the seedlings of Italian and foreign hemp are brown, red-brown, rose, wine and green, green being the rarest. Only one form, an Indian hemp, showed a very high ratio, viz. over 70% of seedlings with green hypocotyls. After a single selection from the forms having green hypocotyls, the progeny showed 90% of seedlings with green hypocotyls. Selection of Italian hemp forms with differently coloured pericarps and hypocotyls had the object of finding a possible rapid means of distinguishing between imported and Italian forms.

*C. sativa* L. may show premature flowering, often confused with the development due to early ripening. Observations show that in premature flowering Italian hemps rarely end their vegetative cycle suddenly. Retardation followed by what may amount to cessation of activity of the reproductive organs generally occurs; at the same time new vegetative activity starts and later that of the reproductive organs, so that the ultimate stem length may be satisfactory. Applications of nitrates gave good results in cases of premature flowering but not in cases of early ripening. Premature flowering seems to be promoted by intense light, high temperature and lack of rain, with, at the same time, the formation of the so-called "organ pipe" structures during the early development of the stem. E. W.

2359. KRICKL, M. 633.527.2–2.111–1.521.6(43)
Zur Frage der Züchtung einer winterharten *Arundo donax* L. (**The problem of breeding a winter hardy *A. donax* L.**)
Züchter 1946 : **17/18** : 67–69.

*A. donax* L. grows in Italy but is not sufficiently winter hardy for the Austrian range of climate.

Rhizomes representing a collection of all the forms from Italy and Southern France were sown on a large scale at Karlhof, which has the climate of the Pannonian plain. The severe winters of 1939–41 destroyed all the plants except a small proportion which in 1940

had been covered with straw and so suffered no serious damage. Straw covering for large plantations is not economic, therefore a preliminary selection of clones from the populations of the Mediterranean region was made to discover the most winter hardy types which would withstand temperatures of − 8° C. or even − 15° C., undamaged. The use of clones would, however, not result in sufficient winter hardiness, so that sexual multiplication is necessary to obtain types which will withstand far lower temperatures. In the Austrian climate a normal seed harvest seems almost impossible to obtain, but two suggested methods whereby seeds from plants (clones), already proved winter hardy, might be obtained are (i) short day treatment or (ii) replanting in Mediterranean localities. The young plants from any seed obtained should at once undergo another test for winter hardiness and the best would be planted in the Mediterranean areas to produce more seed.
Some of the Karlhof plants which had withstood the severe winter of 1941–42 were replanted at Tamsweg, the coldest place in Central Europe, where the spring frosts show temperatures of − 10° C. to − 15° C., so that rapid and sure tests for winter hardiness could be made. The effect of extreme cold on the shoot buds and woody parts of the rhizomes is described. The results showed that the not very severe winter conditions of 1943–44 at Tamsweg approach the limit for the winter hardiness of *A. donax*. The woody parts of the rhizomes must be regarded as more winter hardy than the shoot buds, but it is essential to obtain plants in which the shoot buds formed before winter are sufficiently winter hardy to withstand Austrian winters. E. W.

2360. Singh, H. B.,
Ramanujam, S. and 633.528.2:577.881:575.11(54)
Pal, B. P. 635.61:577.881:575.11
**Inheritance of sex forms in *Luffa acutangula* Roxb.**
Nature, Lond. 1948 : **161** : 775–76.

After briefly summarizing the results of Poole and Grimball on the inheritance of sex forms in *Cucumis Melo* (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 1227) the authors give a preliminary account of the results of a study of the inheritance of sex forms in *L. acutangula*. There are three types of plants in this species, monoecious, hermaphrodite and andromonoecious, all of which, on self-pollination, were found to be true breeding. The results are given of crossing the three types in all possible combinations. It seems reasonable to suppose, on the basis of these results, that two gene loci, each with a series of multiple allelomorphs, are involved in the inheritance of sex forms. The various possible sex forms are tentatively designated as monoecious $AG$, andromonoecious $a'G$, androecious $aG$, gynomonoecious $Ag'$, gynoecious $Ag$, and hermaphrodite $ag$, $a'g'$, $a'g$ and $ag'$.
It is suggested that the genotype of the hermaphrodite form of *C. Melo* used by Poole and Grimball in crosses with monoecious was of the constitution $a'a'g'g'$.

## SUGAR PLANTS 633.6

2361. Parthasarathy, N. 633.61:576.16:575.127.2(54)
**The probable origin of North Indian sugarcanes.**
J. Indian Bot. Soc. 1946 : 133–50.

The following are examined: the geographical and ecological distribution of *Saccharum spontaneum*, *S. officinarum*, and the North Indian canes (*S. Barberi* and *S. sinense*); the genetics and cytology of *S. officinarum*, natural and artificial hybrids between this species and *S. spontaneum* and of the North Indian canes; and the taxonomy of *S. spontaneum*, *S. officinarum* and the North Indian canes. On the basis of the various types of evidence, it is suggested that the North Indian canes probably arose as a result of extensive hybridization between *S. spontaneum* and *S. officinarum* in the regions of Bengal, Orissa and Bihar.

2362. 633.61:576.312.35
Parthasarathy, N. and 633.61:576.16:576.356.5
Subba Rao, K. S. 633.61:575.127.2(54)
**Chromosome survey of *Saccharum spontaneum* L.**
Indian J. Genet. Pl. Breed. 1946 : **6** : 5–10.

The value of *S. spontaneum* in breeding the Co. canes at the Sugarcane Breeding Station, Coimbatore, is reviewed, and an indication is given of the wide range of forms of the species, the need for an exhaustive collection throughout its geographical distribution being stressed. The chromosome numbers of 29 types in the collections at Coimbatore, originating from India and elsewhere, have been determined. Except for a few aneuploid forms, the chromosome numbers show that polyploidy exists within the species, with a basic number of $x = 8$. No form with $2n = 48$ has so far been identified in the collections; thus no support is given to the hypothesis of E. K. Janaki Ammal that the multiple series in this species are di-basic in origin, having arisen by hybridization of a form with $x = 10$ and another with $x = 6$ (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 1102). The discrepancies in the chromosome numbers cited by different authors for the same clonal types are discussed; it is suggested that such discrepancies may be due to difficulties in cytological examination, caused by the crowded condition of the chromosomes in the somatic plates. The chromosome numbers reported by the authors have been obtained from clear counts in pollen mother cells.

The chromosome numbers of the various forms examined do not correspond with the size and stature of the plants under conditions at Coimbatore, e.g. the dwarfish and wiry-leaved Lahore form and the tall Himalayan form (Holes I) have the same chromosome number, viz. $2n = 54$. The forms with the smallest number of chromosomes are found in the north and north-west regions of India, and the forms with the higher polyploid numbers show a geographical trend from the north-west to the south-east.

The difficulties of classification based solely upon morphological characters are discussed. Cytological investigations are to be undertaken to facilitate the systematic classification of the various types.

2363. ARTSCHWAGER, E. 633.61:578.088

**Vegetative characteristics of some wild forms of *Saccharum* and related grasses.**

Tech. Bull. U.S. Dep. Agric. 1948 : No. 951 : Pp. 69.

Descriptions are given of 38 wild forms of *S. robustum*, *S. edule* and *Erianthus*. Each clone is described under the headings of origin, chromosome number, culms, leaves and distinguishing characters. Drawings illustrating the main features of each form, and an identification key are included. A previous bulletin has dealt with the vegetative characters of forms of *S. spontaneum* (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 249).

2364. SUBBAIAH, M. 633.61:581.44:578.088

**Studies on pith in sugarcane. I. A new method for the quantitative estimation of "pith" in sugarcane.**

Mysore Agric. J. 1947 : **26** : 25–35.

A quantitative method is described for estimating the amount of pith in sugar cane. The percentage of pith $= \frac{V - J - F/D \times 100}{V}$, where $V$ c.c. is the volume of a given sample of cane, $J$ c.c. is the volume of the juice present in $V$ c.c., $F$ grm. is the weight of fibre and $D$ the specific gravity of the fibre. Methods of sampling and determining the volume and weight of portions of cane and obtaining the other data necessary are described. Information is given on the pith formation of M.H. 320, Co. 419 and other varieties determined by the technique described. Pith development was found to be affected by season. Some varieties develop hardly any pith when planted in the summer, whereas when planted during the winter months the same varieties show a greater formation of pith. Flowering in sugar cane was found to have no effect on pith development. A close negative correlation between the specific gravity of the cane and percentage of pith is recorded.

2365. ARCENEAUX, G. 633.61–1.557(76.3)

**Yield trends in tests of sugarcane varieties and in annual production of cane and sugar in Louisiana.**

Sug. Bull. N.O. 1948 : **26** : No. 18 : 289–99.

An analysis has been made of the yield data obtained during the period 1936–1947 from sugar cane varieties planted in Louisiana. A wide discrepancy has occurred in recent years between the average yield of sugar per ton of cane for the state as predicted from the results of field tests and the actual yield. Research on such problems as mechanical detrashing, selective topping, mud free loading, etc., is therefore recommended. In this connexion an attempt should also be made to breed varieties more suitable to mechanized harvesting. In addition, research on problems related to deterioration between cutting and milling is desirable.

Some of the chief commercial varieties have shown decline in yielding capacity in the period under review. It is pointed out that essentially loss in yielding capacity or deterioration is not due to changes in the variety, but to environmental variations, such as changes in the pathogenicity of diseases, favourable and unfavourable alterations in cultural methods, or the inability of the plant to keep weeds under control as a result of its poor shading capacity. The increased attention of the breeder to such problems is urged, combined with investigations on all field practices.

2366. ABBOTT, E. V. 633.61–2–1.521.6(76.3)
**Some observations on weather and diseases in relation to the sugarcane yield curve in Louisiana since 1935.**
Sug. Bull. N.O. 1948 : **26** : No. 18 : 305–10.

The relationship of weather conditions and diseases with yield of cane in tons per acre during the period 1935–47 is analysed. Since 1935 the use of adapted commercial varieties with improved resistance to mosaic and root rot has resulted in a lessened influence of those diseases upon yield in recent years. Less progress has been made in developing varieties resistant to red rot.

2367. SLOAN, W. J. S. 633.61–2.111–1.521.6(94.3)
**Frost resistance of new varieties in Central and Southern Queensland.**
Cane Gr. Quart. Bull. 1948 : **11** : 112–15.

Notes are presented on the reaction of the following sugar cane varieties to the cold winter of 1946 in Queensland: Q.28, Q.42, Q.45, Q.50, Trojan and C.P.29/116.

2368. SLOAN, W. J. S. 633.61–2.112–1.521.6(94.3)
**Notes on drought reactions of some newer varieties.**
Cane Gr. Quart. Bull. 1948 : **11** : 109–12.

Observations are given on the behaviour of the following sugar cane varieties under the droughty conditions of 1946 in Queensland: Trojan, Cato, Eros, Comus, Q.28, Q.42, Q.44, Q.45, Q.47, Q.49, Q.50 and C.P.29/116.

2369. KHANNA, K. L. and
RAMNATHAN, K. R. 633.61–2.7–1.521.6:581.49(54)
**Studies in the association of plant characters and pest incidence. I. Nature of leaf surface and mite attack in sugarcane.**
Proc. Nat. Inst. Sci. India 1947 : **13** : 327–30.

The incidence of mites (*Paratetranychus indicus*) on *Saccharum spontaneum* and some Coimbatore varieties is reported. Forms of *S. Munja* and *S. arundinaceum* growing in the same area remained free from attack. Susceptibility to attack appeared to be associated with stomatal grooves and spinous growths on the under-surface of the leaves, which afford protection to the mites.

2370. GOUAUX, C. B. and
TAGGART, W. G. 633.61.00.14(76.3)
**Sugar cane test fields—Season of 1947.**
Sug. Bull. N.O. 1948 : **26** : No. 18 : 281–88.

The results of the tests conducted by the Louisiana Agricultural Experiment Station at eight locations on recently released varieties, seedling canes and standard varieties are reported.

2371. SIMON, E. C. 633.61.00.14(76.3)
**Report on new sugar cane varieties.**
Sug. Bull. N.O. 1948 : **26** : No. 18 : 279–80, 313.

Data are given on the performance in 1947 of the most recently released sugar cane varieties and promising unreleased varieties included in the test fields of the Louisiana Sugar Experiment Station.

2372. King, N. J. 633.61.00.14(94.3)
**Varietal trials, 1947 season.**
Cane Gr. Quart. Bull. 1948 : **11** : 116–24.

The results of sugar cane varietal trials carried out in 1947 at different locations in Queensland are summarized. The varieties tested included Eros, 32-8560, Badila, Q.50, Q.28 and other Q. canes, A.130, A.147, Trojan, P.O.J. 2878, Co. 301, Co. 290, C.P. 29/116 and S.J.4.

2373. King, N. J. 633.61.00.14(94.3)
**Varietal trials.**
Cane Gr. Quart. Bull. 1948 : **11** : 158–65.

The results are given of a number of sugar cane variety trials conducted in Queensland, which came to hand too late for inclusion in the previously published report (cf. Abst. 2372).

2374. 633.63:575.113.4–18(45)
Rossi, U. 633.71:575:578.08(45)
Nuovi orizzonti nella selezione del tabacco. (**New horizons in tobacco breeding**).
Tabacco 1948 : **52** : 85–88.

Reference is made to the breeding method which has been applied by Prof. Dojmi di Delupis at the sugar beet research station at Rovigo (cf. Abst. 2008). All characters, including quantitative ones like yield and quality, are regarded as discontinuous, any given value being comprised of two quantities, one of which is constant and the other varies according to a succession of whole numbers. It follows that only certain discrete values are possible. Any quality of a plant is represented by a triad of three values, the initial, intermediate and final, the combination of which gives a measure of the intensity of hereditary transmission of the character. Selection should consist in choosing the most favourable combinations. These postulates all emerge from the multiple factor principle of quantitative inheritance.

The breeding method used consists of determining the plant weight and the refractive index of the sap at the date of harvesting. From previously prepared tables the triad of values to which these figures correspond is established. The values of the triads for 100 individuals are arranged in a frequency distribution. The individuals with values above a certain limit are selected and crossed in pairs under conditions of spatial isolation.

The method has given good and rapid results with sugar beet and is now being tried with tobacco.

2375. Minina, E. G. and
Grammatikati, O. G. 633.63:581.6:519.241.1
(**Evaluation of the sugar content in roots of sugar beet according to age-morphological characters of leaves**).
Bjulletenj Moskovskogo Obščestva Ispytateleĭ Prirody (Bull. Soc. Nat. Moscou) 1946 : **51** : No. 2 : 46–56.

A number of morphological features of the leaf such as length of petiole, length of leaf and level of maximum width were examined in successive leaves of sugar beet plants and all were found to conform to Krenke's law of cyclic senescence and rejuvenation (cf. *Plant Breeding Abstracts*, Vol. XV, p. 181). With increasing physiological age the leaves become broader and the petioles shorter; the sugar content also rises in the roots. Certain environmental factors such as watering cause a rejuvenation effect, which involves a reduction in sugar content but can be detected by a suitable study of the leaf characteristics.

## STIMULANTS 633.7

2376. Piescu, A. 633.71:575
"Ameliorarea tutunului" de P. Koenig şi L. Rave. (**"The improvement of tobacco" by P. Koenig and L. Rave**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 226–35.

An extended summary in Rumanian is given of the chapter on tobacco breeding by Koenig and Rave in the *Handbuch der Pflanzenzüchtung* edited by Roemer and Rudorf.

2377. 633.71:575(45)
Relazione sull'attività tecnica dell'Istituto nel primo esercizio di gestione (1° giugno 1946—30 giugno 1947). **[Report on the technical activity of the Institute in the first period of working (1 June 1946 to 30 June 1947)].**
Tabacco 1948 : **52** : 36–42.

In this report of the work of the Istituto Scientifico Sperimentale per i Tabacchi [Tobacco Research Institute] in Italy, reference is made to selection work with oriental tobaccos, which has continued, and to crosses that have been made of Perustica Giant with Trebizond and with Japanese tobaccos, with the object of producing forms combining good yield and quality. Further selection has been carried out with Hybrid No. 4, and with all the main Italian varieties. A collection of 1514 tobacco species and varieties has been maintained and crosses have been made with 45 of them.

Promising $F_1$ hybrids have been obtained from the crosses Resistente 142 x Herzegovina 93/1 and Resistente 142 x Big Cuban, and a large-leaved form of Resistente 142 has been selected.

2378. PIESCU, A. 633.71:575(49.8)
Zece ani de activitate a Institutului (29. VI. 1930–29. VI. 1940). **[Ten years of activity at the Institute (29 June 1930–29 June 1940)].** Bul. Cultiv. Ferment. Tutun. 1940 : **29** : 185–202.

A review is given of the work on tobacco, including breeding work, undertaken by the Institut Experimental pentru Cultivarea și Fermentarea Tutunului [Experimental Institute for the Cultivation and Curing of Tobacco], Rumania.

2379. PIESCU, A. and
ANIȚIA, N. 633.71:575(49.8)
Planul de activitate agro-fitotechnic al secției Agricole dela Institutul Experimental pentru Tutun C.A.M. București-Băneasa. **(The plan of agro-phytotechnical activities of the Agricultural Section of the Experimental Institute for Tobacco of the C.A.M.*, Bucharest-Băneasa.**
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 313–41.

The method, used to improve the tobacco crop are mass selection, individual plant selection, hybridization, obtaining heterotic individuals, isolating superior mutants, and acclimatizing foreign varieties.

2380. 633.71:575(68.9)
MOFFETT, A. A. 633.71.00.14(68.9)
**Breeding and selection.**
Rep. Trelawney Res. Sta. S. Rhod. 1947 (1948) : Publ. No. 11 : 23–29.

The trials conducted at the Trelawney Tobacco Research Station in the season under review included two varietal tests, a trial of varieties derived from intravarietal hybrids, and two comparisons of the progeny of single plant selections. In one of the varietal trials Jamaica Wrapper, Willow Leaf, White Stem Orinoco, Yellow Mammoth, Bonanza and Gold Dollar were tested. The other varietal test consisted of an experimentation on eight varieties and strains, mostly from Canada, including three strains of Bonanza, two strains of Gold Dollar, Duquesne, Yellow Mammoth and Jamaica Wrapper. The following hybrid varieties were tested: Gold Dollar x Jamaica Wrapper C1/46, Bonanza x Jamaica Wrapper 5/46, 6346, 7/46, 10/46 and 8/46. The trials of the single plant selections included progenies of selections of (1) Bonanza, Gold Dollar and other varieties, and (2) hybrid varieties derived from Jamaica Wrapper x Gold Dollar and Bonanza x Jamaica Wrapper.

2381. PIESCU, A. 633.71:575.125(49.8)
Activitatea institutului în 1947. **(The activity of the institute in 1947).**
Bul. Cultiv. Ferment. Tutun. 1947 : **36** : 127–41.

In this report on the work of the Institutul Experimental pentru Cultivarea și Fermentarea

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* Casa Autonomă a Monopolurilor.

Tutunului [Experimental Institute for the Cultivation and Curing of Tobacco], Băneasa, it is mentioned that tests have been carried out on the agronomic and chemical qualities of Rumanian tobacco varieties. It is also hoped to utilize hybrid vigour in the crosses Ghimpaţi x Bafra and Ghimpaţi x Jalomiţa.

2382. 633.71:581.037:575(45)
Istituto Scientifico Sperimentale per i Tabacchi. (**The Tobacco Research Institute**).
Tabacco 1948 : **52** : p. 130.

At a meeting of the executive council of the Italian Tobacco Research Institute (Istituto Scientifico Sperimentale per i Tabacchi) a programme of collaboration with the Rome Institute of Electrogenetics (Istituto di Elettrogenetica) was worked out. Attempts are to be made to produce forms with higher nicotine content by X-ray treatment of *Nicotiana rustica* and *N. Tabacum* and to produce fertile hybrids between these two species.
Other topics debated included tests with some promising lines of the hybrids Virginia Bright, Maryland and Kentucky.

2383. 633.71:581.04:576.356.5
Chirţoiu, Ş. 633.71:575.127.2
Darea de seamă asupra activitătii Institutului Experimental C.A.M. Băneasa, pe anul 1941. (**Report on the activities of the Experimental Station of the C.A.M.*, Băneasa for the year 1941**).
Bul. Cultiv. Ferment. Tutun. 1942 : **31** : 3–10.

Fertile colchicine-induced polyploids have been obtained of various infertile hybrids.
Élite plants have been selected and isolated in the varieties Ialomiţa, Virginia, Havana, Maryland, Broadleaf, Persicean [Persian] and Secco din Sardegna [Dry Sardinian].
A large number of intraspecific and interspecific hybrids have been raised both for industrial utilization and for theoretical research.

2384. Dimofte, N. 633.71:581.192(49.8)
Contribuţiuni la compoziţia chimică ă varietăţilor de tutun americane. (**Contributions to the knowledge of the chemical composition of American tobacco varieties**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 218–25.

The varieties Havana Seed, Broadleaf, Broadleaf Windsor and Maryland have been analysed for water content, total nitrogen, protein, nicotine, total reducing substances, carbohydrates, polyphenols and the Schmuck coefficient.

2385. Dimofte, N. 633.71:581.192:575.12
Studiul chimical corciului Ghimpaţi x Molovata (comparativ cu varieăţile Ghimpaţi şi Molovata pura). [**The chemical study of the hybrid Ghimpaţi x Molovata** (**compared with the pure varieties Ghimpaţi and Molovata**)].
Bul. Cultiv. Ferment. Tutun. 1945 : **34** : 20–35.

The tobacco hybrid Ghimpaţi x Molovata has less protein than either parent, more nicotine in the upper grades though not in all the lower grades, and a soluble carbohydrate content and Schmuck coefficient lying between those of the parental varieties.

2386. Vlădescu, I. and
Dimofte, N. 633.71:581.192:581.01(49.8)
Influenţa cârnirii asupra compoziţiei chimice a tutunului. (**The influence of removing the flowers on the chemical composition of tobacco**).
Bul. Cultiv. Ferment. Tutun. 1941 : **30** : 226–311.

Information is given on the content of nicotine, total nitrogen, crude protein, total reducing substances and soluble carbohydrates of the varieties Molovata, Ghimpaţi, Ialomiţa and Sătmărean, when grown under different cultural conditions, and when the flowers were either left alone, or were removed at various stages in their development. Certain varietal differences in the biochemical reaction of the plants to the various treatments are noted.

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* Casa Autonomă a Monopolurilor.

2387. Neagu, N. 633.71:581.192:581.165.71:575.1
Efectul altoirii tutunului asupra conținutului in nicotină. (**The effect of grafting tobacco on the nicotine content**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 24–42.

Striking reductions in the nicotine content of the tobacco varieties Ghimpați, Molovata, Sătmărean, Iaka and Ialomița have been obtained by grafting them on potato, tomato or *Datura Metel* stocks. In all cases however the plants obtained from the seeds of the scions had a normal nicotine content, except in the case of the seedlings of the Molovata scions. In these plants, the nicotine content was reduced by 2–3 times.

2388. Vlădescu, I. and
Dimofte, N. 633.71:581.192:581.45(49.8)
Cârnirea tutunului şi repartiția substanțelor în frunze. (**Removing the flowers of tobacco and the distribution of substances in the leaves**).
Bul. Cultiv. Ferment. Tutun. 1942 : **31** : 32–79.

An investigation was made into the amount of dry matter, total nitrogen, protein and nicotine in the leaves of the varieties Molovata and Sătmărean, both when the flowers were left alone, and when they were removed. Determinations were made periodically and on each of the leaves developed by the plants (cf. 2386).

2389. Neagu, N. 633.71:581.48(49.8)
Numărul capsulelor la semincerii de tutun. (**The number of capsules on the tobacco plant grown for seed**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 296–311.

The relation between quantity of seed produced and the number of capsules allowed to develop on the plant has been investigated in the varieties Molovata, Ghimpați, Ialomița and Banat. In the case of the former two varieties, the quantity of seed per capsule was not affected by the total number of capsules; in the case of the latter two varieties, there was a slight increase in the seed content per capsule when the total number of capsules was reduced.

2390. 633.71:581.48(49.8)
633.71:581.142.035
Piescu, A. and 633.71:581.142.036
Aniţia, N. 633.71:581.143.26
Despre sămânța de tutun. (**Tobacco seed**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 91–217.

Extensive details are given of the morphology, germinability and effect of temperature, light and storage on germinability of Rumanian tobacco varieties and other *Nicotiana* species.

2391. Vlădescu, I. and
Dimofte, N. 633.71:581.6(49.8)
Cenuşa şi alcalinitatea cenuşei in diferitele sorturi şi calități industriale de tutunuri fermentate romaneşti. (**The ash and the alkalinity of the ash in different varieties and industrial grades of Rumanian curing tobacco**).
Bul. Cultiv. Ferment. Tutun. 1940 : **29** : 233–45.

Information is given on the ash content and degree of alkalinity of the ash in various grades of the varieties Iaka, Molovata, Ghimpați, Ialomița, Banat and Sătmărean. In contrast to the opinion of other investigators, the authors hold that the ash of tobaccos of superior quality is less alkaline than that from inferior quality tobaccos.

2392. Zamfirescu, I. I. 633.71:581.6(49.8)
Contribuțiuni la studiul capacității de absorbție şi reținere pentru apă a tutunului in pulvis. (**Contribution to the study of the capacity of powdered tobacco for absorbing and retaining water**).
Bul. Cultiv. Ferment. Tutun. 1941 : **30** : 319–50.

Tobacco powder of the variety Ghimpați has a greater capacity for absorbing water than that of the variety Molovata; its retentive capacity, on the other hand, is less.

2393. CHIRŢOIU, Ş. and
VLĂDESCU, I. 633.71:582
Tutunul Samsun. (**The tobacco variety Samsun**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 12–23.

A description is given of the morphological and biochemical characteristics of the variety Samsun, also an account of its putative origin.

2394. CHIRŢOIU, Ş. 633.71–1.525:575.42(49.8)
Activitatea Institutului Experimental C.A.M. pe anul 1942. Dare de Seamă. (**Activity of the C.A.M.* Experimental Station for the year 1942. Report**).
Bul. Cultiv. Ferment. Tutun. 1943 : **32** : 3–11.

Acclimatization studies are reported on the following varieties: Samsun, Xanthy-Iaka, Havana Seed, Maryland, Secco di Sardegna [Dry Sardinian], Drăgăşani and some varieties of *Nicotiana rustica*. Selected seed of the varieties Molovata, Ghimpaţi and Ialomiţa is being produced.

2395. SMITH, T. E. and
CLAYTON, E. E. 633.71–2–1.521.6:575(75.6)
**Resistance to bacterial wilt and black shank in flue-cured tobacco.**
Phytopathology 1948 : **38** : 227–29.

An attempt is bring made at the North Carolina Agricultural Experiment Station to develop a flue-cured tobacco variety resistant to both bacterial wilt and black shank (*Phytophthora parasitica* var. *Nicotianae* Tucker).

Tests have been carried out on the resistance of black shank resistant genotypes to bacterial wilt, and on the resistance of bacterial wilt resistant genotypes to black shank. Three wilt resistant varieties, T.I. 448A (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 907), Oxford 26 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 382) and Oxford 43–2, were compared with the black shank resistant variety Florida 301 and the black shank and wilt susceptible varieties Gold Dollar, Yellow Special, and Oxford 400 and 401. Oxford 26 and 43–2 are $F_6$ lines of T.I. 448A x 400. All three wilt resistant genotypes were found to have some resistance to black shank. The black shank resistant varieties, Oxford 1, 2, 3 and 201, were compared with the wilt resistant variety Oxford 26, and the black shank and wilt susceptible varieties Gold Dollar and Oxford 400. Oxford 2 and 201 showed some resistance to wilt.

Hybrids between black shank resistant lines and wilt resistant lines have been studied. The hybrids were selected for wilt resistance and desirable growth characters in the $F_2$, $F_3$ and $F_4$ generations. Nine $F_6$ lines of Oxford 202 averaged 47% black shank infection in a planting in which Florida 301 had 3% and Oxford 400 100%. Thus it was found that several lines selected only for wilt resistance had moderate resistance to black shank.

Resistance to either disease depends upon the inheritance of multiple factors; therefore without linkage the development of a variety resistant to both diseases would be extremely difficult. Recent results have, however, indicated linkage between the factors for resistance to black shank and those for resistance to wilt, as, for example, in Oxford 26 and 43–2, derived from the cross T.I. 448A x 400, or Oxford 202. It therefore appears probable that the required variety with a high degree of resistance to both diseases can be developed without using excessively large populations.

2396. KÖHLER, E. and
HAUSCHILD, I. 633.71–2.8–1.521.6
Betrachtungen und Versuche zum Problem der "erworbenen Immunität" gegen Virusinfektionen bei Pflanzen. (**Observations and experiments on the problem of acquired immunity to virus infection in plants**).
Züchter 1947 : **17-18** : 97–105.

The authors' theory of cross immunity is that when one virus causes infection in a plant it exhausts the supply in the cells of certain fundamental structural materials, so that they are no longer available for a second related virus, when it is used to inoculate; the second virus, therefore, produces no infection since it cannot multiply and penetrate the phloem. In cases where the second virus is unrelated to the first, infection occurs because each virus requires a different substrate and thus despite the depletion of structural material due to the first virus the second can still obtain the necessary material for its development.

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* Casa Autonomă a Monopolurilor.

A case in which cross immunity fails was analysed. A young Samsun tobacco plant was first infected by the ordinary green tobacco mosaic virus, then inoculated with a yellow strain of the same virus. Complete resistance to the second virus was proved. Again, when Samsun or White Burley plants were first inoculated with the same yellow strain and then with the para-tobacco mosaic virus they again proved fully resistant. When, however the para-tobacco mosaic virus is used first and followed by inoculation with a yellow strain of tobacco mosaic virus, then no resistance develops. Super-infection is here possible because, as was proved later, para-tobacco mosaic virus and ordinary tobacco mosaic virus have the same tendency to aggregation throughout a wide range of dilutions. No differences were found in the rates of multiplication during the first twelve days after infection.

The so-called acquired immunity, first observed by Price in the case of tobacco ring spot virus, is shown to be in keeping with the theory of availability in the cells of basic material necessary for development of a given virus. Thus a virus streaming into young leaf tissue may affect its metabolism in such a way that material (e.g., radicles or molecules, etc.) in the cells, essential for the virus, are produced in smaller amounts than before the virus entered; the supply of these structural materials soon becomes exhausted and premature cessation of multiplication of the virus ensues. The validity of this explanation might be tested by chemical methods. E. W.

2397. GERSTEL, D. U. 633.71–2.8–1.521.6:576.356.2:575.127.2

**Transfer of the mosaic-resistance factor between H chromosomes of *Nicotiana glutinosa* and *N. tabacum*.**

J. Agric. Res. 1948 : **76** : 219–23.

The mosaic resistant tobacco Holmes Samsoun was developed by substituting a chromosome of *N. glutinosa* carrying resistance for the $H_t$ chromosome of Samsoun. Use by the breeder of this transference of resistance, however, has been confronted with difficulty because factors of *N. glutinosa* reducing yield are linked with resistance. Gerstel has found that failure of pairing of the $H_t$ chromosome of *N. Tabacum* and the corresponding $H_g$ chromosome of *N. glutinosa* prevents exchange of segments and consequent recombination (cf. *Plant Breeding Abstracts*, Vol XIV, Abst. 598). The present paper however reports that an occasional exchange of segments may occur between these two chromosomes, and the possibilities of eliminating in the translocation the factors which reduce yield or of narrowing down the sector of *N. glutinosa* until only the resistance factor or factors are retained are discussed.

Attention is drawn to the fact that since the completion of the present paper, a recent note by Valleau has been brought to the author's notice. In this note the production of commercial mosaic resistant varieties is reported, and thus the final problem of breaking the linkage of the resistance factor or factors in *N. glutinosa* with the factors affecting yield has been accomplished (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1852).

2398. YU, TE-TSUN and
TSU, CHIA-TSAI 633.71.00.14(51)

**(The studies of tobaccos cultivated in Yunnan).**

J. Agric. Ass. China 1947 : No. 185 : 5–8.

Tests are reported of tobacco varieties, mostly of the flue-cured type, at the Yunnan Botanical Institute, Kunming. The varieties include white flowered tobacco (*Nicotiana persica*), yellow-flowered tobacco (*N. rustica*), and varieties of *N. Tabacum* cultivated at the Institute, such as Gold Dollar, Yellow Mammoth, Maryland, White Stem Orinoco and Changpo No. 1.

Changpo No. 1, Mammoth Gold, Special No. 400 and Special No. 401 produced leaves of excellent quality; Special No. 400, Changpo No. 1, Gold Dollar, Mammoth Gold and Yellow Mammoth gave the highest yields.

2399. Klinkowski, M. 633.72:581.9
Das Kulturareal des Teestrauches. Ein Beitrag zur Wanderungsgeschichte kolonialer Nutzpflanzen. (**The area of cultivation of the tea plant. A contribution to the history of the migration of colonial economic plants**).
Züchter 1946 : **17/18** : 80–89.

An extensive survey is given of the distribution of the tea plant throughout the world. The subject is mainly treated from the economic standpoint. E. W.

2400. Tubbs, F. R. 633.72–2.472.2–1.521.6(54.8)
**Notes on blister blight.**
Tea Quart. 1947 : **19** : 50–56.

Information is included on differences in the susceptibility of tea clones to blister blight (*Exobasidium vexans*). Such differences indicate that selection of resistant clones is possible.

2401. 633.73:575(67.8)
**Thirteenth Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi 1946.**
Pamphl. Dep. Agric. Tanganyika 1948 : No. 45 : Pp. 15.

The results are reported of experiments on selected seedlings planted in 1938; seedlings versus clones; conversion from the single stem to the multiple stem method of growing; clonal selections planted in 1943; and other aspects of coffee production.

2402. Fluiter, H. J. de 633.73–2.6–1.521.6(92.2)
Het aaltjesprobleem in de koffiecultuur. (**Eelworm problems in coffee**).
Tijdschr. PlZiekt. 1947 : **53** : 101–09.

In Java three eelworms attack coffee: *Heterodera marioni* Cornu, *Anguillulina similis* Cobb and *A. pratensis* de Man. The last is the most serious pest and infected plantations are more heavily attacked by *Xyleborus morigerus* Blanf., *X. Morstatti* Hag., *Pseudococcus citri* Risso and *Ps. deceptor* Gr., and the root-louse fungus (*Polyporus Coffeae*) that lives symbiotically with the latter.

Conuga coffee, a hybrid of Congensis and Uganda, is remarkably resistant to eelworm as is the clone Bang 124–01, and resistant types have been selected from Excelsa types. C. B.

2403. 633.74–2.411.4–1.521.6:575.127.2(72.86)
**Research at Turrialba on cacao diseases.**
Cacao Inform. Bull. 1949 : **1** : No. 7 : 1–4.

An account is given of various investigations at the Cacao Centre, Inter-American Institute of Agricultural Sciences, Costa Rica, on cacao diseases, including pod rots due to *Phytophthora Faberi*, *Colletotrichum* or *Diplodia*, and several seedling diseases.

Experiments are being carried out on *Theobroma simiarum* as a possible source of disease resistance. Tests of the resistance of this species to *Ph. Faberi* are in progress. *Th. Cacao* and *Th. simiarum* have been successfully crossed, using the former species as female parent; the cross failed when the pollen of *Th. Cacao* was used. Progenies of the cross are to be studied. Both species have been found to possess the same chromosome number ($2n = 20$).

2404. 633.74.00.15(72.98)
**Research, new techniques and government aid in Trinidad.**
Cacao Inform. Bull. 1948 : **1** : No. 6 : 1–2.

**Cacao allocations and cocoa product prices.**
Ibid. 1948 : **1** : No. 6 : p. 3.

A fuller account is given of cacao investigations at the Imperial College of Tropical Agriculture, Trinidad, from the data reported by R. L. Fowler as a result of his visit in 1945 (cf. Abst. 2405).

The list of investigations at Cacao Centre, Costa Rica, on establishment of new plantations is continued; it refers to work on the maintenance of plantations for the first two years and the improvement of existing plantations.

2405. 633.74.00.15(8+72)
633.74:581.165(72)

**Cacao survey yields valuable information.**
Cacao Inform. Bull. 1949 : **1** : No. 5 : 2–3.

**Cacao in Venezuela, Colombia and Trinidad.**
Ibid. 1948 : **1** : No. 5 : 3–4.

**Investigations on new plantations.**
Ibid. 1948 : **1** : No. 5 : p. 4.

A summary is given of a survey made by R. L. Fowler in 1945 of the cacao producing centres in Colombia, Nicaragua, Trinidad and Grenada. Brief reference is made to diseases, cultural methods, improvement work and other topics.

Cacao production and research in Colombia, Venezuela and Trinidad are outlined, as a result of a visit to these countries in 1948 by R. H. Allee and M. Elgueta.

Investigations on the establishment of new cacao plantations in progress or planned at the Cacao Centre, Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, are summarized. The work on propagation includes investigations on type of cuttings; hour of obtaining cuttings; preparation, effect of growth stimulants; insertion of cuttings; maintenance during period of rooting, including clonal variation; potting; planting; and other methods of propagation.

2406. Schär, U. 633.75:575(49.4)
Die Berwertung von Mohnkapseln während des Krieges. (**The utilization of poppy capsules during the war).**
Die Grüne Schweiz. Landw. Z. 1948 : **76** : 674–76.

Breeding of poppy plants was undertaken to discover the relation, if any, of the yield of seed from the capsules to the morphine content. E. W.

2407. 633.79(42)

**New varieties of hops.**
J. Inst. Brew. 1948 : **54** : 117–18.

Comments are made on the exhibition of hops held under the auspices of the Institute of Brewing, at the College of Technology, Manchester, in January, 1948. The varieties Brewer's and Bullion, and the *Verticillium* wilt resistant hops OJ47, OR55 and OW5 are discussed.

2408. Salmon, E. S. 633.79.00.14(42)
**Thirtieth report on the trial of new varieties of hops, 1946.**
J. Inst. Brew. 1948 : **45** : 7–16.

This report has been dealt with previously (cf. Abst. 1116).

## CONDIMENTS 633.84

2409. Petrosini, G. 633.842:577.16(45)
Sopra il contenuto vitaminico dei vegetali: ricerche sui peperoni. (**The vitamin content of plants : studies on peppers).**
Quaderni Nutrizione, Napoli 1948 : **10** : No. 3 : 1–30.

Tabular data are presented which show the effect of manurial treatment and variety on the vitamin C content of eight varieties of sweet pepper (*Capsicum annuum*). The varieties differed significantly, the highest vitamin C content being found in the varieties Lungo Dolce [Long Sweet], Connetto Forte [Strong Gherkin] and Locale di Marigliano [Marigliano Local]. The maximum values for the low group were invariably below those for the high group, and the relative order of the varieties remained the same in different localities and conditions. Differences were also observed between varieties in the rate at which they lost vitamin C towards the autumn.

An examination of the results shows that the varieties with the highest vitamin C content are those that are characterized by the most vigorous growth and these varieties also reacted most favourably to mineral manuring.

2410. NÓGRÁDY, GY. 633.842:581.192:578.08(43.91)
A paprika jellegminták csípősségének meghatározása a kapszaicin fluoreszcenciás titrálásával. (**The determination of sharpness in red pepper by a fluorescence-titration method**).
Rep. Hung. Agric. Exp. Sta. 1943 : **46** : 160–64.

Capsaicin can be extracted from the red pepper with 50% methyl alcohol solution. In neutral solution capsaicin shows fluorescence with an intensity dependent upon the concentration. Picric acid prevents this effect; with a titration method the capsaicin content can therefore be measured. Samples of 0·1 grm. are sufficient. The method is thus suitable for breeders. T. P. B.

2411. VASS, P. and
VASS-BOSSÁNYI, I. 633.842:581.192:578.08(43.91)
Gyakorlati módszer a paprika csíposégének (kapszaicin tartalmámak) meghatározására. [**Practical method for determining sharpness (capsaicin-content) of red pepper (*Capsicum annuum*)**].
Rep. Hung. Agric. Exp. Sta. 1943 : **46** : 155–59.

This method is based on the blue reaction of $VOCl_3$ with the capsaicin of red pepper. This reaction is measured with a photometer, which in the experiment consisted of a Lange-Roth electric instrument. The colour value of the paprika solution in acetone must be allowed for in order that the capsaicin colour value can be calculated. This capsaicin-value is satisfactory for determining the capsaicin content. The capsaicin value of first class paprika is 17–22, second class 22–26, third class 26–30, fourth class 30–36, and fifth class (sharp) over 36. The method is excellent for plant breeders, as the sample used for the experiment is only 0·4 grm. Two people can make 50 measurements in five hours. Shaking and measuring times must be exceedingly accurate, but this disadvantage can be eliminated if $VOCl_3$ dissolved in ether is used. T. P. B.

2412. TORBÁGYI-NOVÁK, L. 633.842–1.8:581.192(43.91)
A Garamvölgyi cukorgyár rt. Zselizi gazdaságában fűszerpaprikával beállított műtrágyázási és fajtakísérletek eredményei. (**The results of an experiment carried out on the estate of the Garamvölgyi Sugar Factory Ltd. in Zseliz on different varieties of paprika with different fertilizers**).
Rep. Hung. Agric. Exp. Sta. 1943 : **46** : 248–53.

The experiments were carried out on the determination of the dry matter content of six varieties of red pepper (*Capsicum annuum*). No definite correlation between varieties and dry matter content or between fertilizer and dry matter content could be detected.
T. P. B.

## OIL PLANTS 633.85

2413. ANDERSSON, G. 633.85:575(48.5)
Den svenska oljeväxtodlingens framtidsutsikter. Möjligheter för odlingsmaterialets förbättring genom växtförädling samt för effektiv bekämpning av skadedjur. (**Prospects of oil crop cultivation in Sweden. Possibilities of improving the crop material by breeding and for effective control of pests**).
K. LantbrAkad. Tidskr. 1947 : **86** : 288–97.

In this lecture, delivered to the Royal Agricultural Academy of Sweden, the aims and methods of breeding oil crops for that country are briefly reviewed. The speaker dealt only with the economically more important crops, e.g. winter rape, turnip rape, spring rape, white mustard, poppies and linseed, though research on several others is proceeding at Svalöf.

The superior performance and winter hardiness of Svalöf's new élite of Senraps [Late Rape], Senraps 13, are mentioned, as well as the high yield and oil content obtained from Sv 45/55, a line selected from Lembke's rape. Yield could probably be further increased by breeding. To increase winter hardiness, crossing with winter turnip, though tedious and not much used in practical breeding, is suggested as likely to be successful.

Pest resistance, which depends on varietal differences in earliness or morphological characters, must be used to the full as a factor in raising yield.

As regards winter oil crops, one aim is to produce a winter turnip rape combining the high yield of Lembke's turnip rape with the winter hardiness of Rapido.

Spring rape, which is so valuable for its yield and high oil content, should be bred to obtain faster growing types with more uniform flowering and ripening periods. Progress has already been made in the attack on this problem and efforts are also being made to increase the yield and oil content by hybridizing with autumn rape.

A new élite of Svalöf's Regina spring rape, Sv Regina B, has been produced, yielding 3% more than Regina, and another new variety yielding about 5% more is undergoing multiplication.

White mustard has been difficult to improve and no new varieties have yet been produced. Cumulative crossing of several different lines to induce heterosis in the $F_1$ is now being tried, as well as chromosome doubling, by which it is hoped to obtain better yielding varieties. Increased oil content and seed production are the primary aims.

Poppy improvement has been successful both as regards yield and strength of straw, and new varieties of value for large scale poppy cultivation should soon be available.

Flax improvement work is directed towards better yield and oil content, a shorter vegetation period and stronger straw even in relatively long strawed varieties (cf. Abst. 1785).

2414. NILSSON, H. 633.85:575(48.5)
Den svenska oljeväxtodlingens framtidsutsikter. **(The future prospects of Swedish cultivation of oleiferous plants).**
K. LantbrAkad. Tidskr. 1947 : **86** : 272–87.

The problems connected with the cultivation of oil-bearing plants in Sweden are discussed from various aspects including the need for effective research, breeding and experimentation to ensure that the farmer shall be supplied with the best seed material to counterbalance some of the disadvantages of growing oil crops instead of cereals. Winter hardiness and yields should be increased, and a more even period of maturation of the seed would be desirable in winter rape and turnip rape and in spring rape, to reduce the tendency to shed the seed at harvesting so that methods of harvesting requiring less labour could be used, as well as reducing the process of artificial drying of the seed. In the case of white mustard, types less vigorously developed vegetatively should also make harvesting easier. The yield of linseed could be increased by developing a stronger stalk which would allow of heavier nitrogen manuring without the risk of lodging.

The choice of oil crop, the distribution of oil crop cultivation in Sweden and the demand for such crops and the prospects for Swedish growers are discussed against the economic background.

2415. BALDRATI, I. 633.853.55:577.845(45)
La "femminilità" nel ricino. **("Feminility" in the castor oil plant).**
Ital. Agric. 1948 : **85** : 235–38.

Reference is made to a number of characters whose genic composition has been established in the castor oil variety known as Nero Veronese or Nero Ferrarese. Most of the sexual aberrations displayed a deficiency of female flowers and the concept of "feminility" implies a harmonious equilibrium between male and female flowers, such as is observed in the variety M 6, which is found to do well in a variety of different conditions. The common green castor oil plant of Calabria also shows signs of doing well in a number of localities, not only in the south of Italy.

2416. 633.853.55:582
633.853.55:631.524(6)
LARROQUE, P. 633.853.55:575.42(59.7)
Le ricin. Résultats obtenus en Indochine et possibilités en Afrique. **(The castor bean. Results obtained in Indochina and possibilities in Africa).**
Oléagineux Rev. Gén. Corps Gras Dérivés 1948 : **3** : 206–13.

The variability of the castor oil plant is discussed and a classification based on a study of 127 varieties is proposed. The genus is divided up into *Ricinus communis* var. *minor*, *R.*

*communis* var. *major*, *R. persicus* and *R. zanzibarensis*, of which all except *R. communis* var. *major* are interesting from the point of view of cultivation. *R. zanzibarensis* is not grown in Indochina. The varieties grown in this region are discussed and the possibilities are considered of growing the castor oil plant in Africa.
A section follows on the selection and cultivation of the crop in Indochina.

2417. RAGHAVAN, T. S. and
KRISHNAMURTHY, K. V. 633.853.74:576.312.315
**Cytogenetical studies in *Sesamum*. Part I. Cytology of the parents, *Sesamum orientale* Linn. and *Sesamum prostratum* Retz. and the cytology of the sterile hybrid between them and of the fertile amphidiploid.**
Proc. Indian Acad. Sci. 1947 : **26** : Sect. B : 236–75.

Cytological investigations have been carried out on *S. orientale* ($2n = 26$), *S. prostratum* ($2n = 32$), the sterile hybrid between the two species, and the fertile amphidiploid of this hybrid produced by colchicine treatment.
The chromosomes of *S. orientale* were similar in size and morphology; the chromosomes of *S. prostratum* also showed no differences. In metaphase I of meiosis in *S. orientale* secondary association was noted, the 13 bivalents being arranged in a maximum of seven groups. A particularly interesting feature observed in *S. orientale* was the nucleolar bud arising in the resting pollen mother cells, which in some cases was finally incorporated in the tetrad cells. In *S. prostratum* nucleolar budding was also seen in the resting pollen mother cells, but did not persist through meiosis as in the case of *S. orientale*. The persistent nucleolus arose as a spherical bud from the nucleolus of the resting nucleus; many buds were formed but with the exception of one they usually disappeared in diakinesis. During the earlier stages of meiosis the persistent nucleolus either remained at the equator or lay apart. At anaphase it reached one of the poles before the chromosomes. The possible causes of the movements of the persistent nucleolus are discussed. Since this body has no connexion with the spindle, the suggestion is made that its movements are due to electromagnetic forces in the cytoplasm.
The sterile interspecific hybrid possessed a chromosome number of $2n = 29$. It showed nucleolar budding, and in this respect resembled *S. prostratum* since the buds did not persist through meiosis. Metaphase was characterized by a random distribution of bivalents and univalents; subsequent meiotic stages were also highly irregular. A maximum of eight bivalents was recorded, suggesting autosyndetic pairing among the chromosomes of *S. prostratum*, and an absence of pairing between the chromosomes of the two species.
It is suggested that *S. orientale* originated by allopolyploidy from two putative ancestral species each with a haploid number of $n = 7$, and that *S. prostratum* arose by autopolyploidy from a putative ancestor with a haploid number of $n = 8$.

2418. 633.854.54:575
DESGRANGE, H. 633.52:575
Le lin. Plante oléagineuse. (**Linseed. An oil plant**).
Oléagineux Rev. Gén. Corps Gras Dérivés 1948 : **3** : 80–86.

Reference is made to the linseed varieties adapted for cultivation in Argentina, North America, North Africa and Sweden respectively. Breeding work is directed towards obtaining varieties which can be used for both fibre and oil.

2419. MURRAY, B. E. 633.854.54:581.48:575–183:578.08
**Determining seed size by a volumetric measure.**
Canad. J. Res. 1948 : Sect. C : **26** : 23–26.

A method is described of determining seed size of flax by measuring the volume of ethyl alcohol displaced by a sample of 100 seeds in a glass tube 7 mm. in diameter and 16 cm. in length. The data on 40 flax lines showed that the 1000 kernel weight and "displacement" value are highly correlated, and that it is therefore possible to use the latter for estimating seed size as an alternative to weighing. The volumetric method is more rapid, and also more efficient as an indicator of seed size than weighing with a torsion balance. The method described is useful for the breeder, and is also applicable to other small-seeded crops.

2420. 633.854.56–1.524:575(67.5)
633.854.56:581.16(67.5)
ENGELBEEN, M. 633.854.56:575.42(67.5)
Les bases de l'amélioration d'*Aleurites montana* (Lour.) Wils. au Kivu (Congo belge). [**The bases of the improvement of *A. montana* (Lour.) Wils. in Kivu (Belgian Congo)**].
Agricultura, Louvain 1948 : **46** : 1–29.

The breeding of *A. montana* in the Belgian Congo is discussed. The characters selected are adaptation to the conditions of culture, high oil production and good oil quality. A collection of plants is being established at Mulungu so as to make genetically diverse material available for breeding purposes. The variability in production, the floral biology and the sexual and asexual reproduction of *Aleurites* are discussed. On the basis of data so far available a breeding scheme for *Aleurites* is outlined.

2421. ŠČEGLOVA, O. P. and
ERMOLAEVA, E. JA. 633.854.745:581.143.26.035.1
(**The significance of the relationship of light and dark periods in the photoperiodic reaction of plants**).
Sovetskaja Botanika (Soviet Botany) 1947 : **15** : 125–32.

Experiments are described in which a short-day plant *Perilla ocymoides* L. was subjected to a number of different light treatments in such a way that all sets received the same total number of hours of darkness but the periodicity varied in each treatment. The results show that the decisive factor in causing flowering is the periodicity and not the total quantity of light or darkness.

2422. 633.854.78:575.127.2:576.16
HEISER, C. B. (jun.) 633.854.78:576.312.35
**Hybridization between the sunflower species *Helianthus annuus* and *H. petiolaris*.**
Evolution 1947 : **1** : 249–62.

The above two species are widespread weeds in North America. Although the two species are now sympatric in their distribution, they may have been allopatric at one time. The species show slight differences in ecological preference and in time of blooming. Cytological investigations have revealed that both species have a chromosome number of $2n = 34$. Rings and chains of chromosomes were observed at metaphase I and chromatid bridges with acentric fragments at anaphase I in the meiosis of the $F_1$ interspecific hybrid, suggesting that the parent species differ in translocations and inversions. The $F_1$ hybrid consequently tends to be somewhat sterile. Hybrid swarms between the two species have been found in Arizona, Illinois and Missouri. Two of these hybrid swarms have been analysed on the basis of pollen and seed fertility, and variability in the diameter of the disc. Comparison of the artificial with the putative natural hybrids supported the view that the latter are actually of hybrid origin.

Under natural conditions it appears that introgression has occurred through back-crossing of the hybrids to their parents. The main consequence of the introgression has been to increase the variability of the two species without any tendency towards the amalgamation of the two into a single highly variable species. It is suggested that introgression has been of importance in the development of superior genotypes which may have increased the ability of the two to spread as weeds.

2423. DAVYDOVIČ, S. S. 633.854.78:575.127.2:635.24
(**Crosses between Jerusalem artichoke and sunflower**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 33–37.

Seed production in the Jerusalem artichoke was induced by covering the top of the plant, including the top 5–7 leaves, with opaque bags. Crosses were made with a number of sunflower varieties, the artichoke serving in most cases as the seed parent. An average seed set of 0·1 to 0·2% was obtained. A great number of spontaneous crosses between

*Helianthus tuberosus* and *H. annuus* have been obtained in recent years. In the period 1934–1940, some 3400 inflorescences were pollinated and 4831 seeds were obtained. Great variation was observed in the plants produced but most of them were perennial and tuberiferous, with one main stem in the first year but several in the later years after vegetative multiplication. Many of the hybrids displayed heterosis and flowered abundantly, but only four out of 700 formed seeds.

All the hybrids were resistant to rust, like the artichoke. Their tubers segregated for colour, even when a white-tubered artichoke served as parent. Some of the tubers had a very short dormancy period.

The few seeds obtained by open pollination of the hybrids were sown in 1936 and gave rise to 11 plants. In 1937 ten seeds were obtained by back-crossing one of the hybrids with the sunflower and 21 more from open pollination. Most of the $F_2$ plants had single stems and large inflorescences but formed few or no tubers. The back-cross hybrids were more varied in type and included some of the ornamental kind with as many as 122 inflorescences. They formed plenty of pollen but no seeds.

Most of the second generation hybrids were annuals with no sign of tuber formation. The main interest of the crosses is the use of the $F_1$ hybrids for silage, since the combination of the leaves and tubers gives a product of high nutritive value, the tubers having a very high carbohydrate content.

2424. Pugsley, A. T. and
Winter, G. 633.854.797.00.14(94)
**Safflower: a potential oil crop for paint.**
Rep. Dep. Munitions Supply Lab. Victoria 1947 : No. 171 : Pp. 57.

The literature on safflower as a crop is reviewed, and a progress report is given of recent trials carried out in South Australia by the Waite Agricultural Research Institute on Niphad and other varieties. The results have shown that safflower can be grown in the cereal belt of South Australia, and sown and harvested with the same machinery as that used for wheat. Yields of high quality seed have been obtained which compare favourably with those produced in other parts of the world. Large-seeded varieties, such as Niphad 630 from India, have proved superior to small-seeded varieties. Further field experiments are being carried out. Laboratory investigations on the properties of the oil and its value as a drying oil for paints are also reported. A bibliography of 80 references is appended.

2425. 633.855.34:575.12(6+91)
Conférence en Hollande par le Directeur du Centre de Recherches de l'I.R.H.O.* (**Lecture in Holland by the Director of the Research Centre of the I.R.H.O.**)
Oléagineux Rev. Gén. Corps Gras Dérivés 1948 : **3** : p. 94.

This note on a lecture by M. Ferrand on agriculture in the Dutch East Indies and in Equatorial Africa refers, among other things, to oil palm breeding in Africa. Crosses are to be made between African and Malaysian palms and the progeny studied.

2426. André, E. 633.855.357.4:581.192(6)
Le beurre de karité. Sa composition chimique, latex et graisse. (**Shea butter, its chemical composition, latex and fat**).
Oléagineux Rev. Gén. Corps Gras Dérivés 1947 : **2** : 546–52.

Notes are included on the different varieties of the shea tree, *Butyrospermum Parkii* Kotschy.

## TANNING PLANTS 633.87

2427. Gerstner, J. 633.879:582(6)
**Three closely related acacias of Southern Africa.**
J. S. Afr. Bot. 1948 : **14** : 19–27.

The species *A. karroo*, *A. inconflagrabilis* and *A. natalitia* are compared and taxonomically described.

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* Institut de Recherches pour les Huiles de Palme et Oléagineux.

## MEDICINAL PLANTS 633.88

2428. Skalińska, M. 633.88:576.356.5:581.4:581.9(41+42)
Poliploidalność w obrębie gatunku zbiorowego *Valeriana officinalis* L. w związku z ekologią i rozmieszczeniem geograficznym w Wielkiej Brytanii.
**(Polyploidy within the collective species *V. officinalis* L. in relation to its ecology and geographical distribution in Great Britain).**
Acta Soc. Bot. Polon. 1946 : **17** (Suppl) : 39–45.

The causes of the wide range of variations in the collective species *V. officinalis* were found to be (1) purely phenotypic differences due to the natural environment; (2) polyploidy as represented by tetraploids in which the somatic number of chromosomes is 28, and by octoploids in which it is 56; and (3) a high degree of gene differentiation within the tetraploid and octoploid types.

As regards size and shape of the leaflets forms were found amongst the tetraploids which had tiny uniformly narrow leaflets and which corresponded to the so-called *V. angustifolia* Host., also forms intermediate between this and forms with lanceolate leaves 80 mm. long. The octoploids show a similar series, beginning with forms with the tiny uniformly narrow leaflets, but the range of variation is much wider than in the tetraploid forms; thus the extreme octoploid forms have large leaflets up to 118 mm. in length and so approach the corresponding British form *V. sambucifolia* Mikan., or represent intermediate forms between *V. sambucifolia* and *V. officinalis* s. str. Such extreme forms do not occur in the tetraploid types and therefore may at once be recognized as octoploids.

The incidence of octoploids is less affected than that of tetraploids by the kind of soil.

Somatic doubling of the number of chromosomes in the tetraploid was found to occur.

It is suggested that, besides small gene changes, the main mechanisms causing the morphological differentiations of the collective species *V. officinalis* L. are doubling of the number of chromosomes and hybridization of the resulting higher polyploids with the octoploid species *V. sambucifolia*. E. W.

2429. Reynolds, G. W. 633.88:582:001.4
*Aloe succotrina* Lam. **A history of the plant and its name.**
J. S. Afr. Bot. 1948 : **14** : 1–8.

An account is given of the history of the medicinal species, *A. succotrina*, and its botanical nomenclature.

2430. Reynolds, G. W. 633.88:582:001.4
**The identity of *Aloe kniphofioides* Bak.**
J. S. Afr. Bot. 1948 : **14** : 9–12.

The identity of *A. kniphofioides* Bak. is discussed, and *A. Marshalli* Wood et Evans is shown to be synonymous.

## RUBBER PLANTS 633.91

2431. 633.912(8+72)
Whaley, W. G. 633.913(73)
**Rubber—The primary sources for American production.**
Econ. Bot. 1948 : **2** : 198–216.

The sections on *Hevea* include an account of the early history of rubber production in South America; the nomenclature and taxonomy of the genus; distribution of the various species; and investigations by the United States Department of Agriculture on the breeding and selection of high yielding, disease resistant strains. The article also describes rubber production from *Castilla* [= *Castilloa*] and recent investigations in the United States on guayule, *Taraxacum Kok-saghyz*, *T. megalorrhizon*, *Scorzonera Tau-saghyz*, *Cryptostegia grandiflora*, *C. madagascariensis*, *Asclepias* and *Solidago* as possible sources of rubber.

2432. 633.912:575(54.8)
**Report of the work of the Rubber Research Board in 1946.**
Rubb. Res. Scheme, Ceylon 1947 : Pp. 33.

Trials at Nivitigalakele and Dartonfield of various local and foreign clones, legitimate seedlings of Prang Besar and Tjikadoe clones, and local illegitimate seedlings are reported.

Over 5000 seedlings are available for testing as a result of the pollination programme carried out in 1945.

Studies on the genetic variability of plasticity and associated properties have had to be postponed on account of staff shortage.

2433. 633.912–1.531.12:581.165.1(54.8)
633.912.00.14:581.165.71(54.8)

**Rubber Research Scheme (Ceylon) 1947** (1948) : **24** : Pts 3–4 : Pp. 37.

*Hansford, C. G., Whelan, L. A. and de Silva, C. A.* *Agricultural experimental work of Rubber Research Scheme. Improved planting material. (pp. 22–26).*

Notes are given on the performance of the following budded clones in Ceylon: TJ.1, TJ.16, GL.1, PB.86, MK.3/2, WG.6278, HC.28, WAR.4, PR.107, PIL.B.84, BD.10, BD.5 and PB.186. Promising clones under small-scale trial at the experiment stations of the Rubber Research Scheme include: LCB.1320, PB.6/50, PB.5/139, AV.255, RRI.511, RRI.514, RRI.506, RRI.513, and a number of NAB. clones derived from Tjikadoe seedling trees.

The value of clonal seed is discussed (cf. Abst. **1134**).

*R.........., E.* *Planting notes. (pp. 27–33).*

A list is presented of the varieties of clonal seed from foreign and Ceylon sources, which are now on the Rubber Controller's list of approved material for planting.

2434. 633.913:575(48.5)

Svensk produktion av naturgummi. (**Swedish production of natural rubber**).

Försök och Forskning 1946 : **3** : 107–08.

This paper has already been reviewed in *Plant Breeding Abstracts*, Vol. XVII, Abst. **323**.

2435. *Berkmen, N. and Aksel, R. 633.913:575(56)

Kök Sakizi üzerinde çalişmalar. (**Experiments with kok saghyz**).

Neşriyat Müdürlüğü, Ankara (Genel Sayi : 638) 1946 : No. 11 : Pp. 45.

Experiments on the cultivation, root analysis and improvement of kok-saghyz carried out at the Ankara Seed Improvement Station are reported.

Selected first year plants raised from seed were analysed for rubber content; plants whose roots had a rubber content of over 9% were pulled up from the hot bed and grown in the greenhouse for further investigation. The plants analysed showed considerable variation in rubber content. The data were not sufficient for the relationship between root size and rubber content to be established. Little difference, however, appeared to exist between the rubber percentage of the summer or flowering forms and winter or non-flowering forms, though the root size of fresh plants was greater in the winter forms.

After the plants with less than 9% rubber content had been discarded, the remainder were divided in groups, according to their rubber content, viz. 9–10%, 10–11%, 11–12%, 12–13%, 13 14% and over 14%, and each group was pollinated. . It is hoped that by taking seed from each group, sowing and planting this separately, taking random plants for analysis and keeping those with the higher rubber yield, progress in the work of improvement will be achieved.

The authors are of the opinion that kok-saghyz can be grown under irrigated conditions in Central Anatolia and in those parts of Ankara where rainfall is abundant.

## FRUITS AND NUTS 634

2436. 634(51)

**Notes on ten fruit trees.**

Food and Flowers 1948 : No. 1 : 38–58.

Notes are given on the origin, characteristics, uses, and cultivation in Hong Kong of the following fruits: papaya, *Musa Cavendishii*, *M. paradisiaca* subsp. *sapientum*, jack fruit

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* An extended summary of this paper is on file at the Bureau.

(*Artocarpus heterophyllus*), kwai muk (*Artocarpus hypargyrea*), chiku (*Achras Zapota*), guava, *Psidium cattleianum*, rose apple (*Eugenia Jambos*), Malay apple (*Eugenia malaccensis*), Surinam cherry (*Eugenia uniflora*) and loquat (*Eriobotrya japonica*). Reference is made to varieties of the banana and guava cultivated in Hong Kong.

2437. 634(79.4)

**Yearbook of the California Avocado Society for the year 1947** (1948) : Pp. 154.

*Report of the Variety Committee on Avocados California Avocado Society, June 21, 1947. (pp. 12–14).*

A report is given of recent work of the Variety Committee of the California Avocado Society. The avocado varieties Fuerte, Hass, Nabal, MacArthur and Anaheim are recommended for growing in various districts of southern California. Many experimental varieties are under trial.

*Trask, E. E.* *Report of Subtropical Fruit Committee. (pp. 14–15).*

The work of the Subtropical fruit committee of the California Avocado Society on registering varieties of guava, mango, feijoa and other sub-tropical fruits is described.

*Avocado seedlings registered with the society. (pp. 18–21).*

Notes are given on avocado seedlings registered by the Society.

*Popenoe, W. and Williams, L. O.* *The expedition to Mexico of October 1947. (pp. 22–28).*

An account is presented of the expedition to Mexico in October 1947 and previous visits to Mexico and Central America in which wild and cultivated avocados were studied. Wild avocados observed in various regions are described, and their possible role in the development of the West Indian, Guatemalan and Mexican cultivated races is discussed. Wild avocados are also being investigated with a view to obtaining rootstocks which are resistant to the decline due to *Phytophthora Cinnamomi* under conditions of wet soil. This decline is a serious problem in California. It is suggested that in addition to wild forms of *Persea americana* other species of *Persea* may be valuable as rootstocks for the avocado. The possibilities of other genera as rootstocks, such as *Phoebe* and *Ocotea*, which have some similarity to the avocado, should also be explored. The prospects of introducing new varieties of the Fuerte type into California are considered. In this connexion an account is given of the Rodiles grove near Atlixco, which includes a large number of seedlings resembling Fuerte, believed to have a similar origin to this variety, viz. hybridization between the Mexican and Guatemalan races. Budwood of 12 of these hybrid trees was obtained for propagation at the College of Agriculture, Los Angeles.

*Schroeder, C. A.* *The expedition to Mexico of May 1947. (pp. 29–33).*

A few of the avocado types found in the first official expedition to Mexico of the Committee on Foreign Exploration of the California Avocado Society are described. They include the following: a Mexican type of avocado which, however, lacked the characteristic anise odour of the leaf; specimens which require only four or five months to mature their fruit; a tall type with fruit 2½ inches long beginning to mature in April, and which was extremely vigorous and grew in a region of frequent frosts; off-season trees of the Mexican type which ripened their fruit in the spring. Budwood was collected from these and other types for future investigations on rootstocks, breeding resistance, and botanical and horticultural classification.

*Hodgson, R. W.* *Bearing habits of the avocado. (pp. 35–39).*

The bearing behaviour of the variety Fuerte is discussed. This behaviour depends upon its habit of alternating between an off-crop year and an on-crop year, and upon the temperature conditions during blossoming and fruit setting. Attention is being given to the development of strains which are either less sensitive to unfavourable temperatures or less subject to the alternate bearing habit.

*Zentmyer, G. A. and Klotz, L. J.* — *The cinnamon fungus and avocado decline. (pp. 40–42).*

The problem of avocado decline or root rot due to attack by *Phytophthora Cinnamomi* under wet soil conditions is examined. Investigations on control measures include the study of varietal susceptibility to *Ph. Cinnamomi* and a species of *Phytophthora* causing canker on the trunks, varietal susceptibility to water-logging, and spread of *Ph. Cinnamomi* by nursery stock. So far Guatemalan varieties have proved more susceptible to attack by *Phytophthora* spp. and to water-logging than Mexican varieties.

*Coit, J. E.* — *Experiments with avocados in Lower Rio Grande Valley of Texas. (pp. 57–61).*

Experiments on the performance of avocado varieties in the Lower Rio Grande Valley, Texas, are described. The results suggest that the climatic conditions of this region are not very favourable to avocado growing.

*Cintron, R. H.* — *Fruit setting and fruit development of avocados in Texas. (pp. 62–66).*

One year's observations on fruit setting and fruit development of avocados at the Hoblitzelle Ranch, Mercedes, Texas, are reported. The following conclusions have been reached. Sufficient overlapping in the cycles of opening and closing of the flowers, which exhibit the condition of synchronous dichogamy, occurs under the conditions in question to ensure selfing by insects. Fruit drop appears to affect the Guatemalan varieties most.
The fruit of varieties of all three races, the West Indian, Mexican and Guatemalan, have a low oil content when mature, apparently as a result of the temperature conditions during fruit development. The oil test cannot therefore be used as a measure of maturity under Texan conditions.

*Schroeder, C. A.* — *Hand pollination of cherimoya improves fruit set. (pp. 67–70).*

This article has previously appeared in California Agriculture, July 1947. Cross pollination by hand of the cherimoya on an experimental and commercial scale has improved fruit set. The varieties grown in California have presented no problems in the form of self-sterility or cross-sterility.

*Schroeder, C. A.* — *The Kei apple. (pp. 71–73).*

The Kei apple (*Dovyalis Caffra*) is described. It is a native of the Kei River region in South Africa, and it can be grown in many parts of California. The fruits are 1 to 1½ inches in diameter; when immature they can be used for pickles, and when ripe for jam and jelly. The shrub makes a good hedge plant.

*Beck, W. R.* — *Quick propagation of avocado nursery. (pp. 74–76).*

Details are given of a method by means of which avocado trees can be produced for field planting in a period of seven to nine months. The method includes the application of heat to force germination and plant development, a technique of grafting that allows the bud to be applied on a very small seedling, and raising the grafted seedling in a carton containing soil until ready for field planting.

*Popenoe, W.* — *Reflections, reminiscenses, and observations. (pp. 96–107).*

Comments are made on the course of the avocado industry in California, early work on varietal introduction, the study of varieties in tropical America made at the beginning of the century, the problems of the classification of avocados, the attempt to find improved rootstocks, the possible value of hybrids between the Guatemalan and Mexican races, and other aspects of avocado production.

*Li. L.-Y. and Woodhead, C. E.* *A note on avocado culture in New Zealand. (pp. 108–111).*

Avocado production in New Zealand is reviewed.

*Oppenheimer, C.* *The avocado industry in Palestine. (pp. 112–22).*

This account of avocado production in Palestine includes descriptions of the following varieties: Duke, Northrop, Mexicola, Ganter, Puebla, Caliente, Fuerte, Lula, two seedlings which may be Guatemalan-Mexican hybrids, Anaheim, Benik, Nabal, Queen, Dickinson, Collinson and Winslowson (West Indian race). Pollination behaviour in Palestine is also described.

*Griswold, H. B.* *Committee on foreign exploration. (pp. 123–24).*

A brief annual report is given on the purposes and activities of the Committee on Foreign Exploration of the Society.

*Thirty-second annual meeting of members of the California Avocado Society. (pp. 124–37).*

Various matters are discussed such as the problem of sun-blotch disease in nursery trees and the value of certain varieties.

2438. Li, L.-Y. and
Chou, C.-Y. 634:577.16(51)
(**The vitamin C content of some Fukien fruits**).
Fukien Agric. J. 1947 : **9** : 14–22.

An analysis of vitamin C content was carried out on 26 kinds of fruits, comprising 18 species. The analysis was made at the Department of Horticulture, Fukien Christian University. The results for the Chinese date (*Zizyphus Jujuba*) are reported separately (cf. Abst. 2481). The following figures are given, per 100 grm. of fresh pulp unless otherwise stated: wild rose (*Rosa laevigata, R. bracteata*), 224–374 mgm. of ascorbic acid; *Phyllanthus emblica*, 283–383 mgm.; guava, 125 -183 mgm. for the edible portion and 21–32 mgm. for the core; *Euphoria Longana*, 76–78 mgm.; *Punica Granatum*, 54 mgm. in the exocarp; *Rosa microcarpa*, 43·3 mgm.; *Clausena lansium*, 33·5 mgm.; *Averrhoa Carambola* 23·0 mgm.; and *Litchi chinensis*, 20·8 mgm. The sample of persimmon contained only traces of vitamin C. No vitamin C is said to have been found in the pear, plum, peach, *Rhodomyrtus tomentosa*, *Vitis Labrusca*, crab apple and sun-dried guava. The method of Ballentine (1941) for determining vitamin C content was used throughout the investigations.

2439. Hilkenbäumer, F. 634.1:581.165.71:581.43:575
Ursache und Auswirkung der "Freimachung" bei Kernobst. (**Cause and effect of the formation of roots by grafts in the case of pome fruits**).
Züchter 1948 : **17/18** : 50–56.

In studying the cause and extent of the growth of roots by grafts of pome fruits the following were used: three varieties of pear on quince, Pastorenbirne, Le Lectier and Herzogin von Angoulême [Duchesse d'Angoulême]; eleven varieties of espalier pear on quince, Triumph von Vienne [Triomphe de Vienne], Nordhäuser Winterforelle, Gellerts Butterbirne [Beurré Hardy], Herzogin von Angoulême, Präsident Roosevelt, Alexander Lucas, Diels Butterbirne [Beurré Diel], Clapps Liebling [Clapp's Favourite], Pastorenbirne, Gute Louise v. Avranches [Louise Bonne of Jersey] and Williams Christbirne [Williams's Bon Chrétien]; two varieties of apple on Malus IX, Schöner v. Boskoop [Boskoop Belle] and Freiherr von Berlepsch.

It was found that neither incompatibility between stock and scion, nor the degree of vigour of growth in the shoots of the grafted variety, is responsible for grafts growing roots. The causes are genetic and heritable, but the stimulation, which starts the scion's root growth, was found in all cases to be an unsatisfactory relation between the nutritional requirements of the variety, owing to strong or increased vigour of growth, possibly due to excessive pruning, and a restricted supply of water and nutrients. Varieties growing on the same kind of stocks and on the same site showed varietal differences in the incidence of this phenomenon and also in the number of roots produced and the vigour of their root growth. The same relation between the varieties was largely maintained when tested on other sites.

Root formation of this type was not shown by Triumph von Vienne, and the number of trees developing such roots was low in the case of Nordhäuser Winterforelle, Herzogin von Angoulême, Präsident Roosevelt, Alexander Lucas and Gellerts Butterbirne, higher in the case of Clapps Liebling and Diels Butterbirne, and very high in the case of Pastorenbirne, Gute Louise v. Avranches and Williams Christbirne; in Schöner von Boskoop such root formation was less frequent than in Freiherr von Berlepsch. Reduction in yield was found only in cases of varieties in which the formation of roots by the scion encouraged the growth of stem and shoots. E. W.

2440. KEMMER, E. 634:581.165.711
Zur Frage der Grundlagenforschung im Obstbau. (**On research on rootstock in fruit growing**).
Züchter 1947 : **17/18** : 155–58.

Methods are briefly described for investigating the relations between stock and scion; particular emphasis is laid on separate study of the stocks by the use of seedling stocks. Different ways of obtaining roots and shoots from stocks are suggested. The interchange method of testing scions and stocks is especially valuable in problems concerning incompatibility, yield and differences of root development in vegetatively and sexually reproduced stocks.

In his own experiments the author has observed that progeny of triploids, which are mostly aneuploids, showed poor growth, whereas nearby offspring raised on Paradise stocks were often perfectly satisfactory. Such defective growth was much rarer in the case of seedlings of diploid varieties. Sturdy individuals occasionally occurred amongst the seedlings of triploid origin, but the set so far observable, the satisfactory germination capacity of the pollen and the large number of seeds suggest that in such cases the seedlings are diploids. E. W.

2441. BEAUGENDRE, R. and
ANQUEZ, P. 634.11:575(44)
Les réalisations de la Coopérative Agricole Départmentale de la Sarthe en matière d'arboriculture fruitière. (**The achievements of the Departmental Agricultural Co-operative Society of Sarthe in the matter of fruit tree culture**).
Le Sol, Paris 1948 : No. 1 : 18–20.

It is mentioned that work on the experimental farm acquired by the Agricultural Co-operative Society of Sarthe includes apple breeding. The improvement of the variety Reinette du Mans [Le Mans Pippin] and the adaptation of both French and foreign varieties are being attempted.

2442. 634.11:575:576.356.5
OLDÉN, E. J. 634.11–2.111–1.521.6
Hibernal—en tetraploid äpplesort. (**Hibernal—a tetraploid variety of apple**).
Fruktodlaren 1948 : No. **2** : p. 46.

A brief note is presented on the apple, Hibernal, which Vaaramo's investigations in Finland have identified as a tetraploid ($2n = 68$) of such marked hardiness that it survived the winter of 1939–40. Its habit and other characteristics and its value as a stock or in breeding are mentioned.

2443. GARDNER, V. R.,
TOENJES, W. and
GIEFEL, M. 634.11:575.255
**Segregation in a radially unsymmetrical sport of the Canada Red apple.**
J. Agric. Res. 1948 : **76** : 241–55.

A sport of the apple variety Canada Red, growing in an orchard near South Haven, Michigan, showed considerable variation in size and shape. Some fruits were normal in size, some below normal, while others were larger than the average sized fruit. Most of the fruits, especially the under-sized and over-sized ones, were irregular in shape, being radially asymmetrical. Occasionally a large sized and radially symmetrical fruit was observed. Scions were taken from top-grafted trees of the sport and used for the production of whole trees and top grafts at the Graham Horticultural Experiment Station, Michigan. On the whole, the trees and top grafts of the seven selections studied produced fruit whose average size resembled that of the fruits of the control, but the trees and top grafts of some of the selections consistently yielded small-sized fruit or large-sized fruit. As regards shape, the top grafts and whole trees have in general produced a higher percentage of regular, radially symmetrical fruit than the parent stock from which they were propagated. Certain top grafts and whole trees, however, have borne irregular fruits almost exclusively, while certain others have produced regular fruits almost exclusively. Regularity in fruit shape has been associated with small size, normal or large size. The tree 1–H of selection 526, which combines large size and regular shape, appears to be worthy of introduction as an improved strain of Canada Red.

2444. DARROW, G. M.,
GIBSON, R. A.,
TOENJES, W. E. and 634.11:575.255(73)
DERMEN, H. 634.11:576.356.5:575(73)
**The nature of giant apple sports and their use in breeding.**
J. Hered. 1948 : **39** : 45–51.

An account is given of giant-fruited sports of several apple varieties, which have been studied at the Graham Branch Experiment Station, Grand Rapids, Michigan. No cytological and histological investigations have yet been made on the sports. The sport of Ontario, however, appears to be tetraploid with a diploid epidermis, while the sports of McIntosh and 210A appear to be tetraploid in the innermost histogenic layer. Baldwin, Delicious and Northern Spy only showed the giant sport in certain branches. Rhode Island Greening and Grimes Golden have sectors of "negative giantism", with fruits smaller than normal. The fruit of the giant sports ranged from 49 to 110% heavier than the fruit of the normal types. Certain of the sports equalled the normal apples in fruit quality. The normal trees considerably outyielded the sports in all cases.

The possible value of tetraploid sports in breeding polyploid apples is discussed, and the need for an extensive survey of giant sports is emphasized.

2445. GARDNER, V. R.
TOENJES, W. and
GIEFEL, M. 634.11:575.255(77.4)
**Segregation in russeted sports of the Grimes apple.**
J. Agric. Res. 1948 : **76** : 225–29.

In investigations at the Michigan Experiment Station scions were taken from limb sports of two trees of the apple variety Grimes producing russet fruit, and a number of nursery trees grown from them. Some of the daughter trees showed reversions to the normal smooth-skinned parental type of fruit, while others exhibited a fairly wide range in the degree of russeting. The same differences were maintained year after year. The practical significance of such sporting forms is briefly discussed.

2446. GARDNER, V. R.,
TOENJES, W.,
GIEFEL, M. and
KREMER, J. C. 634.11:575.255(77.4)
**Variability and segregation in the Golden Russet apple.**
J. Agric. Res. 1948 : **76** : 231–40.

Observations at the Michigan Experiment Station on the fruits borne by 5000 spurs of two trees of the variety Golden Russet over a period of seven years showed that: (1) considerable differences occur in the amount of russeting from year to year, which are due to climatic factors; (2) the individual trees and the individual branches are characterized by great diversity with regard to russeting in a single season; and (3) considerable differences in russeting occur between different trees and between branches of the same tree.

Data were also collected on the fruits borne over a seven-year period by 72 daughter trees propagated from selected limbs of Golden Russet. Within individual trees a diversity in russeting similar to that observed in the fruit of the parent trees was found. Differences between individual trees and also in some cases differences between groups of trees of the same selection, were more or less constant from year to year.

The observations on both parent and daughter trees lead to the conclusion that the variety Golden Russet is a chimaera.

2447. 634.11:576.356.5

En pentaploid äppleplanta. (**A pentaploid apple**).
Försök och Forskning 1947 : **4** : 30–31.

The writer records the results of crosses between tetraploid types of the Belle de Boskoop apple on the one hand and diploid and triploid forms on the other. All resulting plants were aneuploids.

New crosses were made in 1945, on a larger scale with the triploid varieties Galloway and Ribston pollinated by the Belle de Boskoop No. 38/1. A better set was obtained than with tetraploid pollen and the seeds were better developed than in the triploid x diploid crosses. One plant from the Galloway x No. 38/1 cross had 85 somatic chromosomes. One of its sister plants was a triploid and the rest were aneuploids with chromosome numbers between 53 and 65.

All the aneuploids were vigorous and made steady growth, whereas the pentaploid grew slowly and had a short thick stem with short internodes and thick almost leathery leaves with markedly biserrate margins. The pentaploid showed higher values for size of stomata and leaf thickness than the tetraploids and triploids; its leaves were pointed at the base, and the whole plant presented a somewhat stunted appearance, though not malformed or dwarfed. Some tetraploids also showed slow growth in the first years but subsequently produced vigorous shoots with large leaves. The practical value of such high chromosome types is to be investigated.

2448. EINSET, J. and
BLASER, H. W. 634.11:576.356.5:575.255(73)

**Chromosomal periclinal chimeras in leaves and flowers of six apple sports.**
Genetics 1948 : **33** : 103–04. (Abst.)

Giant sports on commercial apple varieties are described which have been found to be periclinal chimaeras with diploid and tetraploid zones of tissue (cf. Abst. 1811).

2449. 634.11:576.356.5:581.162.5(48.5)
JOHANSSON, E. 634.13:576.356.5:581.162.5(48.5)

Undersökningar rörande högkromosomiga äpple- och päronträd. (**Investigations on high-chromosome apple and pear trees**).
Berätt. Alnarps Landtbr. - o. MejInst. 1943 (1944) : 115–21.

This is a preliminary report on some tetraploid apple seedlings found in 1937 and later at Alnarp. One seedling with 68 chromosomes came from the cross Belle de Boskoop x Filippa (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 945), probably the first tetraploid known to have arisen by hybridization between two cultivated varieties.

A second seedling from a cross between Bramley (triploid) and Alnarp Rosmarin (diploid) also had a complement of 68 chromosomes and the author found four or five more tetraploids among seedlings from Mère de Ménage x Transparente de Croncels, Mère de Ménage x Gladstone and Galloway x James Grieve.

The tetraploid from Belle de Boskoop x Filippa flowered in 1943; the diameter of its pollen was much larger than that of the parents; the germination capacity was about 80% and the pollen was effective on diploid varieties, though Cox's Orange set only empty seeds; Early McIntosh gave 89 fully formed seeds, from 47 pollinated flowers, and Laxton's Superb gave 34 fruits from 110 flowers pollinated.

Pollination of the 11 flowers on the tetraploid with Early McIntosh resulted in the development of one fruit containing three sound seeds.

Chromosome studies are in progress at Alnarp also on pears and some types with more than 51 chromosomes have been discovered, but not any certain 68 chromosome forms. Incidentally, indirect evidence has been obtained that the pears Olivier de Serres, Souvenir du

Congrès and Winter Williams are diploids in spite of their variability as regards pollen quality and seed formation.

2450. 634.11:581.6(42)
**Recommended varieties of cider apples.**
Herefordshire Agric. J. 1948 : **11** : p. 92.

A list is given of cider apple varieties recommended for general and local planting in England by a committee of representatives of the Long Ashton Research Station, the National Farmers' Union and other organisations. The varieties are classified as early, mid-season and late.

2451. 634.11:581.6(42)
**Recommended varieties of cider apples.**
J. Minist. Agric. 1948 : **55** : 113–16.

Sweet, bitter sweet and sharp varieties of cider apples recommended for cultivation in the West of England are listed, with notes on blossoming, harvesting and tree vigour. The varieties included in the list have been approved by a Committee of representatives appointed by the Long Ashton Research Station, the National Farmers' Union and other organizations.

2452. 634.11–2.7–1.521.6
Kuenen, D. J. 634.22–2.7–1.521.6
Het fruitspint en zijn bestrijding. [**The fruit tree red spider (*Metatetranychus ulmi* Koch) and its control**].
Meded. Tuinbouw-Voorlichtingsdienst, 's Gravenhage 1946 : No. 44 : Pp. 66.

This monograph deals among other points with the biology of the red spider and the influence of climate, variety and root stock on the incidence of the pest.

Comparative observations were made on apple and plum trees.

Leaves with a thin cuticle were found to be more densely infested than leaves with a thick cuticle. The root stock does not affect the thickness of the leaf, and its influence may be due to physiological causes.

2453. Stanton, W. R. 634.11.00.14:581.6(42)
**Bush cider fruit production.**
Herefordshire Agric. J. 1948 : **11** : 65–71.

A summary is given of the results from the 12 plots of bush cider varieties laid down by the Long Ashton Research Station in winter 1935–36 in localities ranging from Devon to Herefordshire, and including one site in Kent.

The results show that with the exception of Kingston Black (Black Taunton) the varieties are of a similar order of vigour and cropping capacity at the different centres. Varieties hitherto regarded as only suitable for limited planting should therefore receive consideration for more extensive use.

Information is given on the yields and vintage quality of the different varieties, the varietal response to the bush method of culture and other conditions, rootstocks and planting distance.

2454. Ball, E. 634.11.00.14:581.6(42.44)
**Nursery of cider apple varieties.**
Herefordshire Agric. J. 1948 : **11** : 57–61.

An account is given of the trials of bush cider apples carried out at King's Acre, Herefordshire, by H. P. Bulmer and Co. Ltd., and of the nursery at the same site where varieties are grown for distribution to growers.

2455. Ball, E. 634.11.00.14:581.6(42.44)
**Long Ashton Research Station trial plot of bush cider varieties.**
Herefordshire Agric. J. 1948 : **11** : 61–63.

The plot of trees at King's Acre, Herefordshire, supplied by the Long Ashton Research Station, was planted during the period 1935–36, and comprises 20 bush cider varieties. The observations made on these varieties over five seasons are summarized. Medaille d'Or [Gold Medal] was the most satisfactory variety during this period, Reine des Pommes [Queen of Apples] the second best, and Michelin and White Jersey the third best varieties.

2456. SAVIDGE, C. 634.11.00.14:581.6(42.44)
**Cider apple varieties and their management.**
Herefordshire Agric. J. 1948 : **11** : 37–45.

The results of trials of cider apple varieties in the County Trial Orchard at Burghill, Herefordshire, are discussed. The orchard was planted 29 years ago. The most promising varieties so far are the bitter sweet varieties, Bulmer's Norman, Chisel Jersey and Horner (Hangdown); the sharp varieties, Frederick and Porter's Perfection; and the sweet variety, Lorna Doone. The following varieties are referred to as apparently resistant or immune to major diseases and pests: Bedan des Partes, Dabinett, Knotted Kernel, Medaille d'Or [Gold Medal], Ashton Brown Jersey, Yarlington Mill, Crimson King, Neverblight and Improved Pound.

2457. PIROVANO, A. 634.13:575(45)
La genetica del pero. (**Genetics of the pear**).
Riv. Frutticoltura 1948 : **10** : 18–22.

In a lecture at Bologna in November, 1947, the speaker referred to the length of time required to produce a new pear variety and pointed out that most of the best pear varieties still come from France. At the Istituto di Elettrogenetica e di Frutticoltura [Institute of Electrogenetics and Fruit Growing] in Rome, over 3000 pear seedlings have been examined and certain promising forms have been selected, some representing reliable types for general cultivation, others high quality types for amateurs. Thirty of these promising types are enumerated, with indications of their parentage and properties, such as time of maturity, yield, disease resistance and quality of fruit.

2458. SCARASCIA, G.-T. 634.13:575.1(45)
Rilievi genetici su popolazioni ibride di pero. (**Observations on the genetics of hybrid populations of pear**),
Ann. Sper. Agrar. Roma 1948 : **2** : 21–28.

A study was made of 368 seedlings from the cross Bergamotte Espéren x Beurré Clairgeau. The conical fruit of the pollen parent was observed in 44·8% of the hybrids; most of the others had fruits of intermediate shape, though a certain number of seedlings had hemispherical or elongated fruits of a type never observed in either of the parents. The fruit colour was yellow in 52·8% of the progeny, reddish in 8%, rust colour in 26·4% and green in 12·8%, although neither of the parents ever bore green fruits. The majority of the fruits ripened in either winter or autumn, only 7·7% in spring and 10·1% in summer; the consistency of the flesh was fine, like that of the Espéren parent, in 46·4% of the offspring. A large proportion of the leaves and fruit were diseased, showing the influence of the Espéren parent on the progeny.

Similar observations were made on 79 seedlings of the cross Passe Crassane x Beurré Clairgeau. Most of them had large or medium sized fruits, 14% had small fruits. Conical and conospherical fruits predominated but again certain individuals with hemispherical or elongated fruits appeared. The fruit colour was yellow in 58·2% of the seedlings, reddish in 14%, rust coloured in 24% and green in 3·8%. Most fruits ripened in autumn or winter, 17% in summer and 1·3% in spring; the fruit flesh was classed as fine in 31% of the seedlings, although neither of the parents had fine flesh. The majority of the seedlings of this cross were healthy.

2459. ANSALONI, A. 634.13–1.524:581.165.711
Un perastro poco conosciuto da sperimentare. (**A little known wild pear for testing**).
Riv. Frutticoltura 1940 : **4** : p. 101.

Seedlings of *Pyrus amygdaliformis* are being tested for use as rootstocks and compared with *P. communis* and *P. Calleryana*.

2460. 634.2:576.356.5:575.247

En spontan typ av tetraploid *Prunus avium*. (**A spontaneous tetraploid type of *P. avium***).

Försök och Forskning 1947 : **4** : 31–32.

The occurrence of polyploid species in *Prunus* is mentioned.

Efforts are being made at Balsgård (Sweden) to discover naturally occurring tetraploids of *P. avium* or to produce such forms artificially.

A Bigarreau cherry tree here described has been found at Fjälkestard with 16 chromosomes in the root tips, but, as it was not known whether the root tips might not have belonged to the stock if the tree had been grafted, herbaceous cuttings were taken to obtain roots from shoots, but without success. Flower buds of the reduction division were therefore taken for cytological examination and the chromosome number in vegetative cells was also determined and found to be 32, i.e., the same as in *P. Cerasus* and hybrid cherries. The tree was therefore a tetraploid, though of a pure *P. avium* type. Chromosome doubling in some variety of sweet cherry must therefore have occurred, and probably vegetatively.

The pollen of the tetraploid showed greatly reduced fertility which was confirmed in crosses with *P. avium* and *P. Cerasus*.

The general sterility may be attributed not to the tetraploid condition *per se*, but to an unsuitable combination of hereditary factors. It is therefore not unlikely that other tetraploid types of *P. avium* would be more fertile and possibly hybridization of different tetraploid types, including *P. Cerasus*, might bring about a differentiation of chromosomes which might lead to better fertility.

2461. ROUSSEAU, M. 634.21:581.6(61.1)

Principales variétés d'abricotiers étudiées en Tunisie—Compte-rendu d'essais de séchage. (**Principal varieties of apricots studied in Tunisia—Report on drying tests**).

Ann. Serv. Bot. Agron. Tunis 1946 : **19** : 125–36.

Tests effected in 1941 and 1942 to find the suitability of various Tunisian, French, Spanish and American varieties of apricots are reported. Among the varieties giving the best results, Caninos and possibly Derby Royal and Tarada are the only ones of commercial value. Other varieties grown in Tunisia, particularly Luizet and Amor Leuch, may be used for drying if preserved in cold storage.

2462. GERBALDI, C. 634.25:581.6:575(45)

Le migliori varietà americane di pesco. (**The best American peach varieties**).

Riv. Frutticoltura 1940 : **4** : 34–35.

An examination of the list of peach varieties recommended for cultivation in the U.S.A. shows that the varieties most popular in America are high yielding, often hardy types, but inferior in quality to the peaches grown in Italy such as Bonvicini, S. Anna Grossa or Bucoincavato. Hybrids of 46 different crosses designed to combine the quality of the Italian varieties with greater yielding ability were raised in 1940.

2463. 634.3:581.481:581.163

HOFMEYR, J. D. J. and 634.3:575.252

OBERHOLZER, P. C. J. 634.3–2.8–1.521.6

**Genetic aspects associated with the propagation of citrus.**

Fmg S. Afr. 1948 : **23** : 201–08.

Attention is drawn to the fact that vegetative propagation is conducive to the accumulation of virus diseases causing degeneration. The occurrence of nucellar embryony in *Citrus* is described. The nucellar seedling is usually more vigorous than the parent tree, producing more vegetative growth but less fruit; the difference in vigour in favour of the nucellar seedling is apparently due to the straining out of virus diseases. Bud variation frequently occurs in *Citrus*; it is considered that such variation offers greater scope for the improvement of existing clones than crossing, in which the production of the desired combination of characters is complicated by the accumulation of undesirable genes due to nucellar embryony and vegetative propagation. In certain cases nucellar seedlings could be used to propagate variant tissue in pure form. Experiments are being planned at the Agricultural Research Institute, Pretoria, to explore the use of nucellar material in propagation. The problems are discussed of stock-scion incompatibility due to virus disease, "stem pitting" of grapefruit probably caused by a virus, and "greening" disease of sweet orange and naartjie, probably also due to a virus in the opinion of the authors. The last two named conditions are commercially serious problems in South Africa. The co-operation of citrus growers and others is invited in the search for virus resistant material, as well as of bud variants which might be valuable in breeding work. It is suggested that the search for resistant bud variants on virus infected trees might be a profitable procedure.

2464. La Porte, J. 634.323:581.162(82)
Floración precoz en pomelos. (**Early flowering in grapefruits**).
Ciencia a Investigación 1948 : **4** : No. **5** : 215–16.

A high percentage of a batch of grapefruit seedlings derived from a fruit from Salta, Argentina, flowered within the first year of growth.

2465. Chatterjee, D. 634.323:582
**Botanical nomenclature of the shaddock or pomelo.**
Nature, Lond. 1948 : **161** : p. 770.

In order to clear up the confusion which exists about the nomenclature of the pomelo, the various names which have been applied to it are given in chronological order and it is explained why the correct name is *Citrus maxima* (Burm.) Merrill.

2466. Ruggieri, G. 634.334–2.482–1.521.6(45)
Fattori che condizionano o contribuiscono allo sviluppo del "mal secco" degli agrumi e metodi di lotta contro il medesimo. (**Factors that cause or contribute towards the development of "mal secco" of citrus trees and methods for its control**).
Ann. Sper. Agrar. Roma 1948 : **11** : 255–305.

Full descriptions are presented of the so-called "mal secco" disease caused by the fungus *Deuterophoma tracheiphila* Petri. Among the various control measures discussed, the use of resistant forms is considered to be the most effective, though limited in its application by the absence of resistant varieties suitable for the various lemon growing zones. The first resistant lemon to be found was the variety Interdonato, a lemon of fine quality that was popular before the advent of the disease; it is an early ripening form, however, and does not fulfil the requirements for the later parts of the season. A higher degree of resistance is found in the lemon Monachello, a variety which does well in rich loamy soils but not in clay. Another resistant variety is Quattrocchi but so far no suitable rootstock has been found for this variety and its use is not recommended. The resistance of Sinatra has not proved equal to that of Monachello. The variety Continella, which would seem to be a bud sport of the lemon Femminello, is also semi-resistant, whilst the resistance claimed for certain other varieties, including Eureka, Lisbon and Villafranca, has not been confirmed. It is clear that a wider range of resistant forms is required and the search for them is being continued. Hybridization between different lemon varieties has been started at the Stazione di Agrumicoltura [Citrus Research Station] at Acireale in Sicily. The study of resistant rootstocks is also being pursued.

2467. 634.38:576.356.5:576.16
Janaki Ammal, E. K. 634.38:576.312.35
**Contributions from the Cytological Department, R.H.S. Gardens, Wisley. I. The origin of the black mulberry.**
J. R. Hort. Soc. 1948 : **73** : 117–20.

With one exception all the varieties of *Morus alba* so far examined have been found to be diploid $2n = 28$. The garden hybrid Makado, forming the exception, is a triploid. The present author has found that *M. rubra*, *M. microphylla*, *M. serrata* and *M. laevigata* are also diploid. In addition, three forms of *M. cathayana* with somatic chromosome numbers of 56 ($4x$), 84 ($6x$) and 112 ($8x$), respectively, are reported. In general appearance the octoploid resembled *M. nigra* ($2n = 308$), the black mulberry, more than the tetraploid and hexaploid forms. The discovery of these three forms of *M. cathayana* helps to bridge the gap between the two economic groups, the diploid species and the 22-ploid. A map showing the distribution of the diploid and polyploid species of *Morus* in Asia, and a diagram indicating the possible origin of *M. nigra* from the diploid *M. alba* are given. In addition, a table summarizes present information on the distribution and chromosome numbers of *Morus* species. It is suggested that the ancestral home of the black mulberry is to be found close to the mountains of Central China, rather that in Persia where the species is reported to have arisen.

2468. FRIES, R. E. 634.41:582(72)
**New or noteworthy Annonaceae from tropical America.**
K. Svenska VetenskAkad. Handl. 1948 : **24** : No. 10 : Pp. 20.

This taxonomic review includes descriptions of several new species, including *Annona oligocarpa*.

2469. MORETTINI, A. 634.451:581.162.32
La influenza della fecondazione dei fiori sulla cascola dei frutti nel Diospiro o Kaki. (**The influence of fertilization of the flowers on fruit drop in the persimmon**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1948 : **32** : 4–13.

In continuation of a previous article (cf. 1838) a study was made of the various factors that influence the set of fruit in *Diospyros Kaki*. Seven varieties, all with hermaphrodite flowers in which the pollen is sterile and which normally form parthenocarpic fruit, were pollinated with pollen from the variety Mercatelli, unpollinated flowers serving as controls. The number of fruits that dropped in late June was much greater and the final yield much less in the unfertilized branches in the varieties Kirakaki, Castellani, Amankaki, Trakankaki and Kaki Tipo. The varieties Mageli and Costata bore large quantities of fruit and their yield showed little or no effect from pollination.

2470. BIRAGHI, A. 634.531:575.114.3
Un probabile fenomeno di reversione nel castagno. (**A possible reversion in chestnut**).
Ann. Sper. Agrar. Roma 1948 : **2** : 45–50.

New shoots arising on chestnuts after attack by *Endothia parasitica* have often been seen to bear atypical leaves more resembling those of certain species of *Quercus*. It is pointed out that the two genera are systematically, and hence presumably genetically, closely related.

2471. MCKAY, J. W. 634.531:575.127.2:575.125(75.2)
**Heterosis in chestnuts.**
Genetics 1948 : **33** : p. 116. (Abst.)

In a ten-year study of heterosis in species of *Castanea*, it has been found that hybrid vigour may be expressed in the embryo of the seed, as shown by increased nut size, and in the growth and development of the seedling and young tree. Varieties and seedlings of the Chinese chestnut (*Castanea mollissima* Bl.) and the Japanese chestnut (*C. crenata* Sieb. et Zucc.) were included in the investigations. Certain $F_1$ interspecific hybrids have shown greater seedling vigour than either parent, while others do not exhibit such a heterotic effect. In most instances, $F_1$ hybrid nuts that were larger as a result of heterosis than the parent nuts produced seedlings that were more vigorous than those of either parent, but there were exceptions to this general observation.

2472. BOÇHANTZEVA, Z. P. 634.574:576.354.4
[BOČANCEVA, Z. P.] 634.574:576.312.32
(**The development of the male gametophyte in *Pistacia vera* L.**).
Bjulletenj Moskovskogo Obščestva Ispytateleĭ Prirody (Bull. Soc. Nat. Moscou) 1945 : **50** : Nos 3–4 : 102–10.

Root tip counts showed a somatic chromosome number of $2n = 30$ in *P. vera* L. The chromosomes are very small but clear morphological differences could be distinguished and the idiogram is illustrated.

Both first and second metaphase proceeded quite regularly, with the formation of 15 bivalents. Descriptions and illustrations are given of the reduction division, tetrad formation, the pollen grains and spermatogenesis, which occurs in the pollen tube.

2473. GUERRINI, P. 634.58(73)
La culture de l'arachide aux Etats-Unis. **(The cultivation of the groundnut in the United States).**
Oléagineux Rev. Gén. Corps Gras Dérivés 1947 : **2** : 539–45.

The characteristics of different varieties of groundnuts grown in the U.S.A. are discussed. The varieties are of three types, the Virginia, the Spanish and the Runner.

2474. MOORE, O. K. 634.61
**The coconut palm. Mankind's greatest provider in the tropics.**
Econ. Bot. 1948 : **2** : 119–44.

An account is given of the geographical distribution of the coconut palm, its production in various countries, botanical characteristics, cultivation and industrial utilization.

2475. 634.61:575.42(54.8)
634.61:581.192(54.8)
**Annual Report of the Coconut Research Scheme for 1945.**
Ceylon, April 1948 : Sess. Pap. No. 8 : Pp. 18.

Investigations are reported on the sugar content of coconut water from different types of palm, sampled at various stages of development of the fruit, and on the sugar content of the coconut "apples" or developing embryo.

The variability in the yield of dwarf palms is being studied on the Bandirippuwa Estate.

The Latin square comparison of the following groups of seedlings continued at Ratmalagara: selected seedlings derived from high yielding palms; unselected seedlings derived from high yielding palms; selected seedlings derived from low yielding palms; unselected seedlings derived from low yielding palms; selected seedlings derived from nuts of estate heaps; and unselected seedlings derived from nuts of estate heaps. The experiment completed its sixth year at the end of 1945. Data are given on flowering and spathe production.

2476. CHANDRARATNA, M. F. 634.65(54.8)
***Garcinia* in Ceylon.**
Trop. Agriculturist 1947 : **103** : 34–37.

The genus *Garcinia* is represented in Ceylon by five indigenous species: *G. Morella*, *G. Cambogia*, *G. echinocarpa*, *G. terpnophylla*, and *G. spicata*. An account is given of the uses of the economically valuable species, *G. Morella* and *G. Cambogia*. The former has a wide range of medicinal uses, and also yields commercial gamboge; the latter species is used extensively as a sour relish and in fish curing.

2477. P'EI, C. and
LAW, Y. W. 634.65:582(51)
**Notes on *Actinidia* of Szechuan and Sikang.**
Bot. Bull. Acad. Sinica 1948 : **2** : 25–33.

Descriptions are given of some Chinese *Actinidia* species, including one new species, *A. hypoglauca*.

2478. MARLOTH, R. H. 634.65–1.524(68)
**The litchi in South Africa.**
Bull. Dep. Agric. S. Afr. 1947 : No. 286 : Pp. 15.

The bulletin includes a brief account of the work on introduced litchi varieties in South Africa. So far the varieties have been arbitrarily classified into three types, viz. the Mauritius, Madras and Chinese. The Mauritius type is the only one at present cultivated commercially in South Africa.

2479. TAI, E. A. 634.653:581.6
**Avocado trial shipments 1947.**
J. Jamaica Agric. Soc. 1947 : **51** : 94–96.

Trial shipments of different avocado varieties were made from Jamaica to England during the period January–February 1947.

The easily obtainable "banana space" with storage at 52° F. was found to be unsuitable for fruit sent to England, since the fruit becomes ripe on the voyage. The West Indian race is very susceptible to cold injury; even the West Indian-Guatemalan hybrid, Collinred, showed some injury at 42° F. Guatemalan varieties, however, withstand a storage temperature of 42°–45° F. satisfactorily.

2480. Richards, A. V. 634.653–1.524(54.8)
**The performance of some imported varieties of avocado in Ceylon.**
Trop. Agriculturist 1947 : **103** : 20–25.

A report is given of the preliminary trials at Peradeniya, Ceylon, in which the introduced avocado varieties Gottfried, Puebla, Pollock and St. Anne are under test, bud-grafted on the local West Indian stock. No evidence has so far been obtained of any incompatibility between these varieties and West Indian stock. The trees have only just come into bearing, and it is therefore premature to compare their yields. Their periods of bearing are of considerable interest on account of the possibility they offer of extending the fruiting season.

2481. Li, L.-Y. and
Chou, C.-Y. 634.662:577.16(51)
[**The Chinese date (*Zizyphus jujuba* Mill) as a rich source of vitamin C.**]
Fukien Agric. J. 1947 : **9** : 6–13.

Investigations have been carried out on the varieties, diseases and cultivation of the Chinese date in Foochow, at the Department of Horticulture, Fukien Christian University. The commercial varieties Mien and Tou were analysed for ascorbic acid content. The Mien jujube contained 383·5–505·2 mgm. per 100 grm. of fresh fruit pulp; the Ton jujube averaged 391·3 mgm. per 100 grm. Jujube confections were also analysed for ascorbic acid content.

2482. Darrow, G. M. and
Waldo, G. F. 634.715(73)
**Growing erect and trailing blackberries.**
Fmrs' Bull. U.S. Dep. Agric. 1948 : No. 1995 : Pp. 34.

The bulletin provides information on the cultivation, diseases and varieties of erect and trailing blackberries.

2483. Hahn, G. G. 634.723–2.452–1.521.6:575.127.2
**Immunity of Canadian black currant selections from blister rust.**
Phytopathology 1948 : **38** : 453–56.

In investigations at New Haven, Connecticut, two selections from crosses made in Canada between *Ribes ussuriense* Jancz. and *R. nigrum* var. Kerry were found to be immune from the blister rust (*Cronartium ribicola*) of pine.

2484. Darrow, G. M. and
Waldo, G. F. 634.75(73)
**Strawberry varieties in the United States.**
Fmrs' Bull. U.S. Dep. Agric. 1948 : No. 1043 : Pp. 30.

The bulletin presents an account of strawberry varieties in the United States, giving information on the origin of the cultivated strawberry; the development of the strawberry growing industry in the United States since the beginning of the nineteenth century; varietal adaptation to climatic soil and other conditions; the comparative fertility of perfect and imperfect flowered varieties; growth habit in relation to fruit production; varieties suitable for transport to distant markets, different seasons, jam making, freezing and canning and domestic gardens; varietal vitamin C content; varieties with resistance to drought, or frost and severe winter climates; varieties possessing fruit of exceptional size, flavour or quality; and everbearing strawberries. A useful table lists the varieties recommended for cultivation in the different districts of each State.

2485. Darrow, G. M. 634.75:575(73)
**Breeding for better strawberries.**
J. N.Y. Bot. Gdn. 1948 : **49** : 166–71.

Strawberry breeding in the United States is reviewed, with reference to frost resistance, improved ascorbic acid content, disease resistance and fruit characters.

2486. Darrow, G. M. et al. 634.75–2.411.4–1.521.6:575(73)
**Report for 1946-47 on strawberry breeding for stele resistance.**
61st Trans. Peninsula Hort. Soc. 1947 : **37** : 13–19.

Strawberry breeding for red stele resistance carried out in the United States during the year under review is described. Earlier investigations on this problem have been previously summarized (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1770).

The resistant variety Fairland, bred from a cross between Aberdeen and Fairfax, has been introduced.

Greenhouse tests were conducted at Beltsville, Md. The results showed that such tests are reliable in selecting highly resistant seedlings. U.S. 3374 and Md. 683 transmit a high degree of resistance to their progeny. Aberdeen, Temple and Auchincruive No. 9 were highly resistant under field conditions, but in greenhouse tests progenies involving these varieties as parents gave no seedlings sufficiently resistant to be saved.

In greenhouse tests conducted at Corvallis, Ore., the majority of the plants examined did not show the definite red stele symptoms characterized by blackened stele but large black lesions and decayed root ends. This condition, termed black root, appears to be associated with red stele but may not be caused by the red stele fungus (*Phytophthora Fragariae*). U.S. 3374 proved to be valuable as a source of resistance to the black root condition.

At the Maryland Experiment Station, hybrid seedlings were selected in red stele infected soil under field conditions. The selected seedlings were derived from intervarietal crosses involving Md. 683, Md. 430, Blakemore and Temple.

2487. Klinkenberg, C. H. 634.75–2.6–1.521.6(49.2)
Aaltjesziekte in aardbeien I. (**Eelworm disease of strawberries I**).
Tijdschr. PlZiekt. 1947 : **53** : 110–14.

As a result of the very severe winter in the Netherlands, the variety Madame Moutôt showed symptoms similar to those of eelworm attack, but due to the great cold. In the same variety symptoms similar to those of eelworm attack result from June yellows, which is hereditary and not due to virus. Distinguishing characteristics are given for both cases. The eelworm disease is caused by *Aphelenchoides fragariae* Ritz. B., but the plants are also attacked by *Ditylenchus dipsaci* Kuehn. The symptoms are described. Work is being continued at the Laboratory for Mycology and Potato Research at Wageningen. C. B.

2488. Soyza, D. J. de 634.771:575.22.061.6
**Colour instability in some plantain varieties.**
Trop. Agriculturist 1947 : **103** : 38–39.

The variety Cuba or Rathambala (*Musa rubra*) and the variety Alu-Kehel (*M. normalis*) in Ceylon each show a variation in which the vegetative parts and fruit bunches are coloured green. These variants are probably due to environmental or pathological causes, but the possibility that they are bud mutants is however not rejected.

2489. 634.771:581.163:575.11
Dodds, K. S. and 634.771:581.162.51:575.113.5
Simmonds, N. W. 634.771:575.12:576.356
**Sterility and parthenocarpy in diploid hybrids of *Musa*.**
Heredity 1948 : **2** : 101–17.

Pisang Lilan, a female sterile, parthenocarpic banana, heterozygous for a segmental interchange, was crossed with three related seeded types of *Musa acuminata*, namely Selangor, Calcutta 4 and Long Tavoy. All were diploids with $2x = 22$. Segregation for parthenocarpy occurred in the $F_1$ of all three families. In two of them it was shown to be determined by a dominant gene, $P$, the expression of which is subject to the action of modifiers. The facts that a few parthenocarpic plants were not completely female sterile and that non-parthenocarpic plants were less fertile than expected may be due to the action of female sterility genes which act as modifiers of $P$. The meiotic behaviour of the parents and hybrids is described. Of 35 hybrids, 34 were heterozygous for the interchange present in Pisang Lilan, from which it is concluded that interchange homozygotes are eliminated. The effective structural homozygosity of the exceptional hybrid, combined with parthenocarpy and diploidy shows that parthenocarpy is independent of structural hybridity and polyploidy in the banana complex. A cross between Selangor and Calcutta 4 was heterozygous for two interchanges. In the various interchange heterozygotes, maximal chromosome associations were rare. The cytological observations are discussed in connexion with the consequent gametic sterility. In some of the hybrids there were errors of spiralization, orientation and movement of the chromosomes, bridges without fragments and spindle irregularities.

2490. 634.771:582
634.771:576.16

CHEESMAN, E. E.

**Classification of the bananas. I. The genus *Ensete* Horan.**

Kew Bull. 1947 : No. 2 : 97–106.

The results of genetical, cytological and taxonomic studies of *Musa* have led the author to the conclusion that the revival of the genus *Ensete* Horon is appropriate, and 25 species hitherto included in *Musa* L. are accordingly transferred to the genus *Ensete*. These include the whole of Baker's subgenus *Physocaulis*. The basic chromosome number of *Ensete* is $x = 9$. The species transferred to *Ensete* are: *E. edule, E. superbum, E. glaucum, E. ventricosum, E. livingstonianum, E. calospermum, E. proboscideum, E. lasiocarpum, E. Buchanani, E. elephantorum, E. Schweinfurthii, E. religiosum, E. arnoldianum, E. Gilletii, E. Wilsoni, E. Holstii, E. ulugurense, E. perrieri, E. fecundum, E. Laurentii, E. Bagshawei, E. Homblei, E. Davyae, E. ruandense* and *E. rubronervatum.*

Two collections from Siam, examined at Kew, represent one or two undetermined and probably undescribed species of *Ensete*; these should prove of interest. *M. gigantea* Kuntze and *M. imperialis* Hort. Vilmorin are species which at present are of doubtful affinity.

A note is given on the geographical distribution of the species of *Ensete* listed.

The relationship between *Musa* and *Ensete* is discussed. A common ancestral stock is postulated, and the genus *Ensete* is believed to retain more of the primitive characters of this stock than *Musa*.

2491. 634.771:582:576.312.35
634.771:576.16

CHEESMAN, E. E.

**Classification of the bananas. II. The genus *Musa* L.**

Kew Bull. 1947 : No. 2 : 106–17.

The genus *Musa* L. is revised as a result of cytogenetical and taxonomic investigations on the collection of *Musa* at the Imperial College of Tropical Agriculture, Trinidad. The character of parthenocarpy or edibility has been ignored in this revision. The genus is divided into group A with a basic chromosome number of $x = 11$ and group B with a basic chromosome number of $x = 10$. Group A is subdivided into the sections *Eumusa* and *Rhodochlamys*, group B into the sections *Australimusa* and *Callimusa*. The section *Eumusa* is generally distinguished by the possession of many flowers and dull coloured bracts, while species in section *Rhodochlamys* usually have few flowers and bright coloured bracts. Species in section *Australimusa* bear seeds resembling those of group A, whereas section *Callimusa* has a distinctive seed shape which serves as a reliable diagnostic character. *Eumusa* Baker includes *M. acuminata* Colla, *M. balbisiana* Colla, *M. Banksii* F. v. M., *M. basjoo* Siebold and *M. nagensium* Prain.

*M. ornata* Roxb. is the best known representative of the section *Rhodochlamys* Baker. Of Baker's nine other species, *M. coccinea* Andr. and *M. salaccensis* Zoll. are now transferred to the new section *Callimusa*, and seven remain, viz. *M. ornata* Roxb. (misnamed by Baker *M. rosacea* Jacq.), *M. Mannii* Wendl., *M. velutina* Wendl. et Drude, *N. sanguinea* Hook. f., *M. rosea* Baker, *M. rubra* Wallich ex Kurz and *M. aurantiaca* Mann. One undescribed species from Burma is also placed in this section.

Section *Australimusa* is typified by *M. textilis* Née. The section includes at least five and possibly eight or more distinct species, including *M. fehi*.

The best known representative of *Callimusa* is *M. coccinea* Andrews. The section contains at least seven good species.

The relationship between the sections is discussed. The author is inclined to regard the division between *Eumusa* and *Rhodochlamys* as unessential, but useful in the field. Interspecific hybrids involving species of the different sections are under investigation. Groups

A and B do not cross easily, on account of the difference in chromosome number. Interspecific and intraspecific differences in behaviour as regards crossing of parents with the same chromosome number have been observed, although such crosses are usually effected readily. As a preliminary result it has been found that species of *Callimusa* do not cross more readily with *Rhodochlamys* than with *Eumusa*, but possibly the reverse. Further work in this direction should give evidence for or against the view that *Rhodochlamys* and *Callimusa* have evolved from *Eumusa* and *Australimusa*, respectively, along independent but partly parallel lines. On other grounds, especially on those of distribution, it seems reasonable to postulate that 11-chromosome and 10-chromosome lines diverged long ago, and that *Rhodochlamys* is a relatively recent offshoot of the 11-chromosome line. Geographical and other evidence does not suggest that *Callimusa* is equally recent; its differentiation from the ancestral stock of *Musa* may have been independent of that of *Australimusa* and possibly earlier.

2492. HUME, E. P. and
WINTERS, H. F. 634.776.1
**Tomatoes from a tree.**
Foreign Agric. U.S. Dep. Agric. 1948 : **12** : 121–22.

A general account is given of the tree tomato (*Cyphomandra betacea*). It is suggested that the species is of interest to cultivators at the higher altitudes in warm countries, such as the upland regions of Puerto Rico.

2493. 634.83:575(73)
DEARING, C. 634.83:575.127.2(73)
**New muscadine grapes.**
Circ. U.S. Dep. Agric. 1948 : No. 769 : Pp. 28.

In 1905 the United States Bureau of Plant Industry organized research on muscadine grapes (*Vitis rotundifolia* Michx) with a view to developing improved varieties for the South-eastern states. Seedlings were planted in 1908 and 1909 at Willard, N.C., which had been produced from crosses made in Texas and Florida between local male vines and standard varieties such as Scuppernong, James and Thomas. The seedlings formed the basis of future breeding work. Selected seedlings were crossed with standard varieties, promising seedlings, local varieties found on field surveys in the South-eastern states, and wild male vines. Selection was carried out on this hybrid material. Two seedlings were obtained from the first group of hybrids, which had perfect flowers and were both cross-fertile and self-fertile; by crossing these two seedlings and seedlings derived from them with standard varieties, new hermaphrodite varieties have been produced. One of the original seedlings, designated V23 R4 B2, was obtained from a cross of Eden with a wild male vine known as Mission, from Florida. The other seedling, designated V19 R7 B2, occurred in the progeny of a cross between Scuppernong and a wild, white staminate vine at New Smyrna, Fla.

Descriptions are given of 15 new muscadine grapes which have now been formally introduced. The following varieties are perfect-flowered: Burgaw, Duplin, Pender, Tarheel, Wallace and Willard.

The dark-fruited variety Burgaw has been produced from the cross Thomas x V19 R7 B2. Except for its perfect flowers, it resembles Thomas in fruit and other characteristics. It is one of the most productive midseason varieties.

The pedigree of Duplin is Stanford x V10 R15 B4 ☿ (Eden x V23 R4 B2). The variety bears large loose clusters of soft, oval dark fruit, ripening in the midseason. The fruit is not of the highest quality, but has some attractive characters which may be of value to breeders.

Pender was derived from the cross Latham x XV20 R36 B4 ☿ [V80 R3 B2 (seed from Denison, Texas) x V19 R7 B2]. It is a highly productive, late maturing white-fruited variety, which is not considered as one of the best varieties available, but primarily as a variety likely to be of interest to collectors of varieties and to breeders.

The cross Lusta x V68 R14 B4 (Eden x V23 R4 B2) formed the parentage of the midseason variety Tarheel. The variety bears clusters of 8 to 10 small, shining jet-black berries, excellent in flavour. It is recommended for domestic growing, the variety collector and breeder, as one of the best of the black small-fruited varieties that have been developed.

Willard was produced from the cross V47 R9 B2 (white-fruited selection, AF 5130) x V19 R7 B2. It is a productive white-fruited grape, ripening fairly early, which can serve as a pollinator for Scuppernong and other pistillate varieties. Its fruit is not quite as good as that of Scuppernong, but is entirely acceptable to wine manufacturers.

The pedigree of Wallace is V26 R5 B4 [James x V66 R3 B2 (Eden x native male vine)] x Willard. It is white-fruited, and recommended for planting with pistillate varieties, especially late blooming ones. In itself Wallace is also valuable as a late fruiting variety of good quality.

The new pistillate varieties described are Cape Fear, Creswell, Kilgore, Morrison, New River, Onslow, Orton, Stanford and Topsail.

Cape Fear was bred from the cross Burgaw x V20 R36 B4 ☿ [V80 R3 B2 (seed from Denison, Texas) x V19 R7 B2]. It is a high yielding very late white-fruited variety, recommended for the variety collection, table use, and probably also for breeding purposes.

Creswell originated from a vine found on the farm of F. R. White, Creswell, N.C. It has been tested in connexion with the breeding investigations, and has given such a good performance that a description of it has been included. It is a late ripening, dark-fruited variety, with excellent dessert quality. It is also recommended for wine manufacture.

Kilgore was developed from a cross of Labama (San Jacinto x ? Brilliant) by an unknown male parent. It produces white fruit, tinged with red and somewhat translucent in appearance; the latter characteristic makes the variety suitable for fancy baskets. The pulp is very soft. In maturity Kilgore is a late midseason variety. It may be useful to the breeder.

The cross Scuppernong x a white fruited native vine (AF 7051) forms the pedigree of Morrison, a variety named many years ago. It is a very early, white variety of the Scuppernong type, but in fruit quality it is better than this variety. It is recommended as a dessert variety, particularly for domestic cultivation.

New River is a seedling whose origin is given as seed of San Jacinto on p. 8 but as seed of Scuppernong on p. 16. It ripens earlier than the parent variety. It is valuable as an early white-fruited grape for the table. The flavour is not as good as that of Scuppernong.

The pedigree of Onslow is V22 R5 B4 [James x V66 R3 B2 (Eden x white-fruited native male AF 7051)] x Burgaw. It is a black-fruited early variety, suitable for dessert and wine making.

Orton and Topsail have the same parentage, Latham x Burgaw. Both are white-fruited midseason varieties. Topsail has been rated as better flavoured than Scuppernong, but its appearance is less attractive on account of its greenish colour and the dark patches which occasionally develop on the fruit. The sugar content of the juice is about 2% higher than that of Scuppernong. Orton is almost as satisfactory as Topsail.

Stanford, a white-fruited and moderately late maturing variety, was obtained from seed of San Jacinto and named some years ago. Its large sized berries and other characters render it a good commercial variety.

The breeding programme has also included hybridization of muscadine grape varieties with North American bunch grapes and with European grapes. But such breeding appears to have only limited prospects, on account of the sterility and deficiency in vigour of the seedlings.

2494. 634.83–2.421.9–1.521.6(75.8)

**_Botryosphaeria ribis_, perfect stage of the _Macrophoma_ causing ripe rot of muscadine grapes.**

Phytopathology 1948 : **38** : 261–63.

The rot disease occurring on the ripe fruit of muscadine grapes is described; it is tentatively referred to as *B. Ribis*, and has been identified in Georgia. The disease appears to be of minor importance. Many muscadine grape varieties are immune. The disease is most severe on Thomas, and to a lesser degree on Lucida, Howard and Dulcet. Hunt, the chief commercial variety in Georgia, Scuppernong, Irene and Yuga are highly resistant.

2495. OLMO, H. P. 634.835:575(79.4)

**Two new table-wine grapes.**

Calif. Agric. 1948 : **2** : No. 6 : 11–12.

The new grape varieties Ruby Cabernet and Emerald Riesling have been developed and released by the California Agricultural Experiment Station.

Ruby Cabernet was produced from the cross Carignane x Cabernet Sauvignon, and combines the good viticultural characters of Carignane with the wine quality of Cabernet Sauvignon. It has given considerably higher yields than Cabernet, and ripens four to six days earlier.

Emerald Riesling was bred from a cross between Muscadelle and White Riesling. It has exhibited resistance to spring frosts. The musts and wines obtained from this variety are characterized by high acidity. The best samples of wine resemble in many aspects the French wine Chablis.

2496. GAETANI, G. 634.835:575.1(45)

Genetica viticola. Comportamento di ibridi di "Moscato d'Amburgo" x "Dodrelabi". [**Genetics of the vine. On the behaviour of hybrids between "Moscato d'Amburgo" (Mandresfield's Black Muscat) and "Dodrelabi"**].

Ann. Sper. Agrar. Roma 1948 : **2** : 29–37.

Observations were made on the progeny of a cross of Hamburg Muscat x Dodrelabi made in 1926. Although both parents had black grapes, 29·9% of the progeny were white, indicating that both parents were probably heterozygous for this character. Data are presented regarding the characters of the sprouts, leaves, clusters and fruits. Tomentose leaves tended to be inherited as a dominant character, form of cluster and fruit size were intermediate, and the muscat flavour was intermediate in degree in most of the hybrids. Certain characters not present in the parent varieties, such as small fruits and green sprouts, were observed in some of the hybrids.

2497. 634.835:575.127.2
634.835:581.143.26:581.056
634.835–2.4–1.521.6:575
FENNELL, J. L. 634.835:581.47:575

**Inheritance studies with the tropical grape.**

J. Hered. 1948 : **39** : 54–64.

A report is given of the progress reached in work on tropical grape species, being carried out by the author in Costa Rica, Puerto Rico and southern Florida, with the view of developing tropical and sub-tropical grape varieties for vineyard cultivation.

Extensive hybridization of tropical and temperate species has been effected, the former being used to provide adaptability and the latter as a source of desirable fruit qualities. The tropical climate and its effect upon growth and dormancy, continuous epidemics of several vine diseases, short day-light and other environmental conditions have imposed several difficult problems in the work of hybridization.

With few exceptions, the poor adaptability of the temperate climate species to tropical conditions has been at least partially dominant in the $F_1$ hybrids, and back-crossing to the wild tropical species in order to attain a satisfactory degree of adaptability has been necessary in most cases. Added to this is the difficulty that adaptability depends upon a complex, multiple gene heredity. The selection of well adapted strains with fruit of even mediocre quality has been the most difficult aspect of the entire programme.

Information is given on the adaptability of the following species to the warm dormant season and to wet and dry soils, and on their reaction to rust (*Physopella Vitis*), anthracnose (*Elsinoe ampelina*), downy mildew (*Plasmopara viticola*) and *Alternaria* leaf spot: the tropical species *Vitis Shuttleworthii*, *V. Simpsoni*, *V. tiliaefolia*, *V. gigas*, *V. rufotomentosa*, *V. Smalliana*, *V. Munsoniana* and *V. Popenoei*, and the temperate species *V. labrusca*, *V. vinifera*, *V. bourquina*, *V. Lincecumii*, *V. Champini* and *V. rotundifolia*. The inheritance of resistance to the above four diseases, and of several other characters, e.g. the size, flavour, texture and sugar content of the fruit, and characters of the fruit bunch is surveyed.

*V. Shuttleworthii*, *V. gigas* and *V. tiliaefolia* have proved to be most valuable parents, and to a lesser extent, *V. rufotomentosa* and *V. Smalliana*. The author believes that the ultimate aim of the breeding work will be achieved by a combination of at least five or six species, in which *V. vinifera* represents only a low proportion of the complex parentage.

2498. Bruni, B. 634.835:581.47:575(45)
Uve da tavola dactiliformi. **(Dactyliform dessert grapes).**
Ital. Agric. 1948 : **85** : 250–52.

Several vine varieties that bear elongated grapes resembling dates in shape are described; a number of recent hybrid varieties are included and indications are given of their origin, main characteristics and time of maturity.

2499. Venezia, M. 634.835:581.6(45)
Indagini e prospettive sulle uve da tavola. **(Investigations on table grapes and their further possibilities).**
Ann. Sper. Agrar. Roma 1948 : **11** : 221–36.

Tabular data are presented concerning the time of ripening, content of acids, reducing sugars and ascorbic acid, refractometric index and fruit characteristics for 91 varieties of dessert grapes contained in the collection at the Stazione Sperimentale di Viticoltura e di Enologia [Research Station for Viticulture and Viniculture] at Conegliano in north Italy.

## FORESTRY 634.9

2500. Rodger, G. J. 634.9.00.15(94)
**Research work in forestry and forest products in Australia.**
Unasylva 1947 : **1** : No. 3 : 21–27.

An account is given of the various branches of research work carried out by the Forestry and Timber Bureau, the Division of Forest Products and other organizations in Australia. Brief reference is made to breeding work.

2501. 634.97:575(73)
634.97(48)
634.97(46.9)
La production ligneuse des forêts mondiales. **(The wood production of the world forests).**
Forêt Québécoise 1948 : **13** : 249–53.

Reference is made to recent research on the selection and hybridization of forest trees in the United States, the Scandinavian countries and Portugal. This work is regarded as promising from the point of view of increasing the wood production of the world's forests.

2502. Pauley, S. S. 634.972–1.531.12:581.165.7(73)
**Budding as a means of introducing genetically superior trees into forest stands.**
Genetics 1948 : **33** : 119–20. (Abst.)

It is pointed out that little consideration has so far been given to the use of superior mother trees, propagated by budding or grafting, in the improvement of forest stands. In this connexion mention is made of the seed plantations established in Denmark and Sweden for the production of high quality seed, consisting of valuable progeny-tested mother trees propagated by budding or grafting. Preliminary studies at the Arnold Arboretum on compatibility between buds and root-stock have suggested that a high degree of compatibility exists between various species and hybrids of poplar. Flower and leaf buds of a species of willow were also successfully budded on poplar rootstock; normal catkin development occurred, suggesting a method of hybridization in which flowers of desired parents can be obtained on the same rootstock potted in the greenhouse. Studies are also being carried out at the Harvard Forest, to explore the possibility of budding as a means of introducing superior hardwood clones directly in the forest or wood lot. Undisturbed wild seedlings have been used as rootstocks. According to the data on bud take, the following combinations are reported to be promising: red x silver on red maple; diploid, tetraploid and hexaploid white ash on diploid white ash; green and red ash on white ash; white oak on red oak; chestnut on red oak; willow on aspens, and reciprocal buddings; and yellow birch on grey birch.

2503. Camus, A. 634.972.1:575.127.2:582(44+76.4)
Sur deux chênes hybrides. **(On two hybrid oaks).**
Bull. Soc. Bot. Fr. 1948 : **95** : 67–68.

The latin diagnoses are given of two oak hybrids designated x *Quercus albescens* Rouy, found in the Maritime Alps, and x *Q. neo-Tharpii* A. Camus of which there are two distinct varieties, *pervirginiana* and *perstellata* found in Texas.

2504. Stebbins, G. L. (jun.),
Matzke, E. B. and
Epling, C. 634.972.1:576.16:575.127.2(74.9)
**Hybridization in a population of *Quercus marilandica* and *Quercus ilicifolia*.**
Evolution 1947 : **1** : 79–88.

Population samples of *Q. marilandica* and *Q. ilicifolia* collected at Lakehurst, N.J., and of *Q. marilandica* collected at Cliffwood, N.J., were compared with herbarium material which had been obtained chiefly from regions where the species do not overlap geographically and ecologically. The characters mainly studied included: leaf width, number of veins on the lower part of the leaf, character of leaf base, pubescence of under surface of leaves, length of mature terminal buds of adult twigs, and depth of acorn caps. On the basis of comparison with standard series for both species, the samples collected at Cliffwood showed no evidence of hybridity, while 37% of the individuals collected at Lakehurst were *Q. marilandica*, 28% were *Q. ilicifolia*, and the remainder were hybrids or hybrid derivatives. The observations showed that in the latter sampling the gene flow was predominantly from *Q. ilicifolia* to *Q. marilandica*. The possible role of ecological isolation, incompatibility of foreign pollen and reduced viability of hybrid embryos in checking the rate of gene flow between the two species is discussed.

2505. Wettstein, W. von 634.972.3:581.165:578.08:575.12
Die vegetative Vermehrung von Aspen (*Populus tremula*). [**The vegetative multiplication of aspen (*P. tremula*)**].
Züchter 1940 : **12** : 92–95.

Preparatory to a genetical study of the aspens, artificial pollination was carried out, using cut branches, to obtain hybrid combinations of widely differing origins. Some combinations resulted in an increase of 40% in the growth of the young seedling. Root cuttings of these hybrids were planted vertically and great differences were found in the capacity for growth. The root cuttings derived from the section *Aigeiros* did so badly that this method of multiplication was useless, but with the rest of the material, cuttings from one-year-old seedlings showed rapid and satisfactory multiplication. This method is important for obtaining material for selection in breeding.
Horizontally planted root cuttings were a failure. E. W.

2506. Madalski, J. 634.972.5:582
Z badań nad *Fagus silvatica* L. i *Fagus moesiaca* (Maly, Domin) Czeczott. [**From studies on F. *silvatica* L. and F. *moesiaca* (Maly, Domin) Czeczott**].
Acta Soc. Bot. Polon. 1947 : **18** : 129–54.

In a study of the number of lateral nerves in the leaves of *F. sylvatica* the author used 23789 leaves and found that this characteristic is not suitable for distinguishing between *F. sylvatica* L and *F. orientalis* Lipsky. He recommends revision of the present classifications of palaeobotanical specimens of beeches, which have been reckoned as belonging to *F. orientalis* solely on deductions from the leaves. On the basis of his results he includes the so-called species *F. moesiaca* (Maly, Domin) Czeczott amongst the synonyms of *F. sylvatica*.
E. W.

2507. 634.972.6:575.127.2:576.312.35(48.5)
634.972.6:576.356.5:581.162.5(48.5)
Löve, Á. 634.972.6:576.356.5:576.354.4(48.5)
**A new triploid *Betula verrucosa*.**
Svensk Bot. Tidskr. 1944 : **38** : 381–93.

Hybridization between *B. verrucosa* and *B. pubescens* and the occurrence of triploids within each of these species are discussed with reference to their chromosome numbers.

A new autotriploid *B. verrucosa* with $2n = 42$ is described. Its stomata are 30·1% larger than those of diploids from the same locality. The leaves of the triploid are also comparatively large and thick and of a darker green than those of the diploids. A complete examination of the pollen fertility has not yet been made, but the female fertility was found to be greatly reduced. Only 0·06% of the seeds examined were filled, and not one of them germinated. The female catkins, seeds and bracts were considerably larger than those of diploids.

Meiosis was found to be very irregular, trivalents and univalents being observed in practically all the pollen mother cells at metaphase I. Lagging of univalents, bivalents and trivalents occurred at anaphase I. Irregular distributions of chromosomes were seen at metaphase II and at anaphase II, many of the cells containing lagging chromosomes.

The occurrence of trivalents and the lack of associations of more than three chromosomes at metaphase I in this and other material show that although the triploid individuals of *B. verrucosa* are really hexaploid, they behave as normal autotriploids.

The triploid is considerably more vigorous than comparable diploids and appears to be somewhat more resistant than the latter to rot. This increased rot resistance of triploids seems to occur also in *Populus tremula* (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1345).

It is concluded from studies of triploid specimens of *B. verrucosa* that an increase in the chromosome numbers of trees may be of great economic value. The induction of polyploidy by colchicine treatment is discussed.

2508. Thomas, W. D. (jun.),
List, G. M. and
Michaelson, M. E. 634.972.8–2.421.9–1.521.6:575(78.8)
**Dreaded disease strikes Colorado elm trees.**
Colo. A and M News 1948 : **2** : No. 12 : p. 6.

It is mentioned in this account of the Dutch elm disease which is caused by *Ceratostomella Ulmi* and carried by the beetle *Scolytus multistriatus* that resistant elms such as the cork and rock elms and the Chinese elm are being used to develop resistant varieties of the American elm.

2509. Loock, E. E. M. 634.973(68)
***Eucalyptus* species suitable for the production of honey.**
J. S. Afr. For. Ass. 1948 : No. 16 : 67–75.

Descriptive notes are given of 14 species of *Eucalyptus* suitable for growing in South Africa as a source of mining and pole timber, and also of nectar.

2510. 634.973–1.524(56)
Adali, F. 634.973–2.111–1.521.5(56)
Verimi gayesile okaliptüs yetiştirilmesi. **(Growing *Eucalyptus* for profit).**
T.C. Tarim Bakanligi Dergisi 1947 : **1** : No. **3** : 20–21.

In recent years increased efforts have been made to cultivate *Eucalyptus* in the south of Turkey. The greatest cold resistance is shown by hybrids of *E. rostrata* which can withstand temperatures of, at most, – 6°. Lower than this they are apt to get frostbitten and later to split. A marshy locality seems to suit them best, but they do not yield well if the rainfall is too high, or if the ground is under water in the wet season. N.I.

2511. Preston, A. 634.973–2.4–1.521.6(94)
**On intraspecific variability of eucalyptus timber to fungal rotting.**
Emp. For. Rev. 1948 : **27** : 133–35.

Experiments on the resistance of the timbers of *Eucalyptus rostrata* and *E. regnans* to fungal rotting are reported. *E. rostrata* was found to be highly resistant; individual trees from any one area showed no significant differences in resistance. *E. regnans* proved considerably more susceptible; individual trees of this species from a given area showed significant differences in susceptibility.

2512. Lindquist, B. 634.975:575.42(48.5)
Den svenska tallen. En rasstudie i bild. (**The Swedish pine. A race study in pictures**).
Svenska. SkogsvårdsFören, Stockholm 1938 : Pp. 83.

The introduction to this booklet deals with: (1) the need for pine tree improvement in Swedish forests at the present time; (2) two ways of attaining this object, namely, stand improvement by selection and breeding from individual trees; and (3) the various types of pine, the broad and narrow crowned and the two geographical types of northern and southern Sweden.

The rest of the book contains photographs of Swedish pine trees in their forest or plantation environment with extensive information on the morphological features, measurement and other characteristics of the trees selected, with the object of providing for the special instruction of those directly responsible for stand improvement of Swedish forest areas. Information is also included bearing on timber quality and production.

2513. 634.975:581.143:537.531:575.12(48.5)
Effet des rayons X sur la croissance de certains arbres. (**Effect of X-rays on the growth of certain trees**).
Forêt Québécoise 1948 : **13** : 389–90.

Reference is made to the experiments which are being carried out in Sweden to combine the characteristics of a Norrland pine variety with the rapid development of the varieties of southern Sweden. Two methods are being used, hybridization and treatment with X-rays. It is recommended that such work be undertaken in Quebec.

2514. Wettstein, W. v. 634.975:581.45:581.192:576.16(43.9)
Alpenlärchenrassen. (**Races of mountain larch**).
Züchter 1946 : **17/18** : 40–44.

In the Gschnitztal (Austria) seed was collected in 1941 from 42 larches and from 13 in 1942; the majority were over 80 years old and some were 150 years old. The first sowings followed at Müncheberg. Here, it was found, in the first year, that there is a distinct difference as regards the number of needles and their percentage of dry matter in seedlings of the larches in the valley meadow lands as compared with larches on high mountain slopes above the normal limit, which for both types was found to be 1500 metres. The plants were moved to Karlsruhe, so that surrounding conditions for the progenies from 1941 were changed; despite this, the supposed racial differences were again found and must therefore be considered as genetically conditioned. Study of the flowering time and the distribution of pollen of standing trees showed that hybridization between the two types of larch could only occur by the rarest chance. E. W.

2515. Wolf, C. B. 634.975:582:575.127.2(73+72)
**Taxonomic and distributional studies of the new world cypresses.**
El Aliso, California 1948 : **1** : 1–250.

The taxonomy and distribution of the 16 *Cupressus* species found in the U.S.A. and Central America are reviewed. Evidence concerning possible natural hybrids is summarized, and descriptions of the species, a diagnostic key and a list of species and subspecies with their principal synonyms are included.

2516. Rycroft, H. B. and
Wicht, C. L. 634.975–1.524(68)
**Field trials of geographical races of *Pinus pinaster* in South Africa.**
J. S. Afr. For. Ass. 1948 : No. 16 : 55–66.

A report is given of the replicated field trials of stocks of *P. pinaster*, which were established in South Africa during the period 1934–36. Data from a few older stands of known origin are also given. The investigation indicates that six races are represented in South Africa, viz. the Corsican, Esterel, Landes, Luccan, Moroccan and Portuguese races. Descriptive notes are included on each of these races. The Portuguese race is proving superior to all the others in growth rate and timber quality.

2517. Hastings, D. M. 635(73)

**The south likes 'em too!**

Sth. Seedsman 1948 : **11** : No. 4 : 15, 44.

Some characteristics of the Triumph bush Lima bean, the lettuces Pennlake and Premier Great Lakes, Cherry Belle radish, Ideal Snowball cauliflower and other new vegetable varieties receive praise (cf. Abst. 2518).

2518. Hastings, W. R. 635(73)

**Meet the new '49ers!**

Sth. Seedsman 1948 : **11** : No. 4 : 14, 54–55.

Descriptions are given of the following new vegetable varieties, probably to be distributed to the trade after the 1948 harvest: Triumph bush Lima bean (cf. Abst. 1944); the lettuces Premier Great Lakes and Pennlake; Cherry Belle radish (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1790); Wax Podded snap bean; the tomato Wisconsin 55; the cauliflower Ideal Snowball; and the sweet corn Flagship. Some reference to these varieties has previously appeared (cf. Abst. 1896).

Premier Great Lakes is an early strain of the lettuce Great Lakes (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 658), developed from a single plant selection at the Pennsylvania State College. It has large dark green leaves and large heads which are uniform and compact and slow to bolt. The lettuce Pennlake is a variety of the Imperial type, also developed at the Pennsylvania State College. The heads are uniform, slow bolting, somewhat conical in shape, compact and with relatively few outer leaves. It is recommended as a substitute for Cornell 456 (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1116).

The white-seeded snap bean Wax Podded was developed by the Ferry-Morse Seed Co., and is superior to Sure Crop Wax in productivity and quality; it possesses some resistance to rust. The variety is stringless, and can be eaten as pods and dry beans.

The tomato Wisconsin 55, produced at the University of Wisconsin, Madison, matures earlier than Rutgers and slightly later than John Baer. The fruits are large under wet or dry conditions, ripening a uniform red scarlet. It appears to be widely adapted, tolerant to early blight, and free from cracking, although it develops some roughness.

The cauliflower Ideal Snowball, developed by H. Fricker, Lucerne, Switzerland, has shown superiority to the Early Erfurt type in trials, producing early, uniform and solid heads. Although recently conditions have been adverse for cauliflower production in the United States, the variety has shown 100% heading and freedom from "ricing".

The sweet corn Flagship is a widely adapted golden yellow hybrid, developed by the Corneli Seed Co. It produces large ears with medium sized grains and 12 to 14 rows, on almost suckerless plants. It shows good drought resistance and yielding capacity; it matures about four days later than Golden Cross Bantam, and outyields this sweet corn and is more suitable for mechanical harvesting. The hybrid can be used for domestic cultivation, the fresh market and for processing.

2519. 635:575(47)
575:633(47)

Pavlov, I. P.

**(Varieties of vegetable and cucurbitous crops).**

Trudy Dagestanskogo Seljskohozjaĭstvennogo Instituta (Proc. Dagestan Agric. Inst.) 1941 : **3** : 122–30.

Seeds of cabbage varieties produced at the Gribovo breeding station, which in the Moscow area gave quite a uniform product, behaved quite differently when sown in central Dagestan, the plants produced showing the widest possible range of variation as regards ripening time, colour, habit and other characters. Forms selected in the south of the U.S.S.R. on the other hand were uniform and gave much better yields. A number of varietal crosses between forms of complementary type as regards growth rhythm and development have been made with the object of utilizing heterosis.

Over 300 tomato varieties were studied for yield and disease resistance. Only one variety, Large Baltimore, was resistant to *Aplanobacter michiganense*. Some of the highest yields were obtained from the varieties bred at the Birjučiĭ Kut station and B.-K. 414 has been crossed with American varieties such as Marglobe, Pritchard and Bison, and with Russian varieties. The best $F_1$ hybrids will be crossed with one another and with the parents to

produce hybrid seed. The most successful varieties of gourd and melon were also those produced by the Birjučiĭ Kut station.
Tests have been made with a number of leguminous plants. In crosses of the winter Peluschke pea with American Wonder C33 the first generation had round yellow seeds.
Tests have been made also with varieties of sweet pepper, egg plant and various root crops and with summer planting of potatoes.

2520. 635:575:007

**New Vegetable Research Station: Dr J. Philp.**
Nature, Lond. 1948 : **161** : p. 715.

The cytogenetical work of J. Philp, who has been appointed director of the Vegetable Research Station to be set up in Britain, is briefly referred to.

2521. 635:577.16(45)
PETROSINI, G 634:577.16(45)
Ricognizione vitaminica sulla nostra produzione vegetale meridionale. (**Vitamin reconnaissance of our plant products in the south**).
Quaderni Nutrizione, Napoli 1947 : **10** : No. 1 : 3–12.

Using an improved method of determination, the vitamin C content has been determined in a number of varieties of sweet pepper (*Capsicum annuum*), tomato and gourd (*Cucurbita maxima*) and in a wide range of other vegetables and fruits.

2522. 635–1.524(51)

**Vegetable trials.**
Food and Flowers 1948 : No. 1 : 59–66.

Trials carried out at Sheung Shui, in the New Territories, Hong Kong, of varieties of cabbage, cauliflower and lettuce imported from England, U.S.A. and Australia are reported.

2523. 635.00.14(42)

**Wisley trials.**
J.R. Hort. Soc. 1948 : **73** : 157–63.

Notes are given on stocks of self-blanching celery, leek, autumn cabbage and vegetable marrow which have recently received trial at Wisley, and which were raised, introduced and submitted for trial by various seed firms.

2524. LENANDER, S. E. 635.00.14(48.5)
Resultat från sortförsök med köksväxter vid Rånna Försöksstation 1938–1941. (**Results of variety trials with vegetables at Rånna Experimental Station 1938-41**).
Berätt. Alnarps Landtbr.- o. MejInst. 1943 (1944) : 161–214.

The newly erected Rånna Experimental Station is concerned primarily with the study of fruit trees and especially cherries, but has also carried out a series of experiments on vegetables to determine the suitability of different varieties to the district. The results of the variety trials which form part of the local variety and strain trials run by the government Horticultural Station at Alnarp are recorded, while the results of special experiments will be published later.
The site, climate, soil and methods of experimentation at the Rånna Station are described. The snap beans, Olsok/35 and Fiskeby/36, proved the highest yielding and the most resistant to diseases, including *Pseudomonas* sp. attack. Two new varieties Arla W:S/41 and Rekord O.E./41, tested in the year 1941 only, were superior in earliness and yield.
Among the wax beans Vax Ideal gave the highest yield and was very resistant to pod spot. Trials of cucumbers, and of different kinds of cabbage, cauliflower, Brussels sprouts, carrots, leeks, celeriac, garden beet, lettuce, spinach, tomatoes and peas are also reported. The leeks tested included a new variety from Denmark, St. Jörgen, regarded as equalling Köpenhamns Torg [Copenhagen Market] in earliness, but in the Alnarp trials superior to it in yield. When earthed up, St. Jörgen also produces a considerably longer white portion than Köpenhamns Torg.

2525. Nilsson, F. and 635.00.14(48.5)
Tometorp, G. 635:575(48.5)
Sort- och stamförsök med köksväxter år 1943. **(Variety and strain trials with vegetables in the year 1943).**
Berätt. Alnarps Landtbr.- o. MejInst. 1943 (1944) : 123–44.

With 1941 a change was made in the method of publication of the regular, extensive annual reports on the official trials of vegetables at Alnarp. These reports have been curtailed to a short report on the variety and strain trials, with a description of the varieties and strains approved during the year and a list of the current selections of first class élite and first class varieties. No new varieties or strains were approved in 1943 but the opportunity is here taken to give a more detailed report on the past and future development of the scheme, and on the objects of the new regulations adopted in 1941, and their application. The results of the 1943 vegetable trials of peas, beans and other vegetables are also recorded.

2526. Lamm, R.,
Tometorp, G. and 635.00.14(48.5)
Voss, Å. 635:575(48.5)
Sort- och stamförsök med köksväxter år 1944. **(Varietal and strain trials with vegetables 1944).**
Berätt. Alnarps Landtbr.- o. MejInst. 1944 (1945) : 165–202.

This report from the Horticultural Research Station at Alnarp records the results of the variety and strain trials of vegetables, giving (1) descriptions of the varieties and strains approved during 1944 and (2) a list of the existing "first class élite" and "first class varieties". The principles and regulations governing the above mentioned trials have been set out (cf. Abst. 2525). The vegetables include tomatoes, peas, carrots, garden beets and celeriac.

2527. Michelly, G. and
Sengbusch, R. v. 635.13:581.192:575:578.08
Züchterisch brauchbare chemische Auslesemethode auf hohen Zuckergehalt bei Möhren. **(A chemical method of grading carrots for high sugar content applicable in breeding work).**
Züchter 1946 : **17/18** : 78–79.

A method of estimating whether individual carrots have more or less sugar than any chosen threshold value was devised for quickly testing the relative amount of sugars in large numbers of carrot extracts in which the disaccharides have been hydrolysed. The tests are made using only half of each carrot, so that exact titrations of the sugars before and after hydrolysis can be made later, using the second half of each carrot which has proved relatively rich in sugars.

The amount of disaccharides in carrots was found to vary from 22%–70% of the total sugars present.

In the subsequent selection of individual plants rich in sugar, it should be noted that this quality may be conditioned genotypically as well as phenotypically, so that exact testing of the progenies through several generations is essential for success. E. W.

2528. Hartmair, V. 635.15:576.312.35:576.356.5
Cytologische Untersuchungen an Rettichen. **(Cytological investigation of radishes).**
Züchter 1940 : **12** : 120–22.

Pollen mother cells were used in studying the chromosomes of 40 varieties of radish, four plants of each variety being examined.

The haploid number was 9 for all varieties, with the exception of one plant which proved to be a triploid hybrid in which, owing to the unequal number of chromosomes in the tetrads, the pollen was sterile. All other plants of the 40 varieties were diploid forms of *Raphanus sativus*. Their morphological differences are therefore not due to differences in chromosome number, and thus the luxuriance of forcing types is not due to polyploidy.
E. W.

2529. NILSSON, F. 635.15–1.531.12:578.08(48.5)
Fröodlingsförsök med rädisa 1941–1945. **(Seed production experiments with radishes 1941-1945).**
Försök och Forskning 1946 : **3** : 106–07.

These experiments, carried out at three centres in Sweden, deal with methods and the effect of manures.

Varietal differences were noted in the yields of seed. Weather and manuring also affected the size and quality of the harvest of seed obtained.

2530. 635.25:576.353:581.04:581.036.5
ŁACZYŃSKA, T. 633.16:576.353:581.04:581.036.5
Wpływ niskich temperatur i kolchicyny na mechanizm podziałów mitotycznych u *Allium cepa* i *Hordeum vulgare*. **(The effect of low temperatures and colchicine on the mechanism of mitotic division in *A. cepa* and *H. vulgare*).**
Ann. Univ. Mariae Curie-Skłodowska Lublin-Polonia 1947 : **2** : 167–80.

The effects of colchicine and of low temperatures on the roots of onion and barley plants were studied cytologically.

In both plants the chromosomes contract under the action of colchicine and on application of low temperatures, the contraction being greater in barley than in the onion. In barley the contraction was unaltered by temperatures of 35°, 25°, 18° and 2° C. whereas in the onion the contraction increased as the temperature fell.

In general the observations showed that low temperatures acting on root cells may in certain cases produce similar cytological configurations to those caused by colchicine, but the spindle undergoes rather less disorganization when low temperatures are applied than when colchicine is used. The specific associations of the chromosomes arising from treatment by low temperature and the formation of bridges accompanying the phenomenon of stickiness indicate the existence of centrifugal forces within the cell. All plants do not react to the same degree to low temperatures. Barley is one of the plants showing c-mitosis at low temperatures, the onion on the other hand belongs to the group of resistant plants which react to low temperatures by only partial contraction of the chromosomes. E. W.

2531. WALKER, J. C.,
LARSON, R. H.,
FOSTER, R. E. and 635.34(73)
KUNTZ, J. E. 635.34–2.484–1.521.6(73)
**Yellows-resistant cabbage varieties in the Danish Ballhead-Hollander group.**
Circ. U.S. Dep. Agric. 1948 : No. 776 : Pp. 12.

The characteristics of the cabbage varieties Danish Ballhead, Wisconsin Ballhead, Improved Wisconsin Ballhead, Penn State Ballhead, Wisconsin Hollander and Bugner are described. With the exception of the first named these varieties are resistant to yellows (*Fusarium oxysporum* f. *conglutinans*).

2532. DREWES, H. 635.34:575.42(77.4)
**Michihli : Choicely Chinese.**
Sth. Seedsman 1948 : **11** : No. 5 : p. 17.

The Chinese cabbage, Michihli, has been selected from the variety Chihli by the Ferry-Morse Seed Breeding Station, Rochester, Michigan. It has given good results in tests in Michigan, Florida and California. It has exceptional uniformity, and has produced more marketable heads than Chihli. The outer leaves are more attractive and a darker green than those of the parent variety; the trimmed heads are firm and well-blanched. The strain is recommended for the fresh market and also for storage for winter sales.

2533. WALKER, J. C. and 635.34–2.484–1.521.6:575(73)
JOLIVETTE, J. P. 635.34–2.484–1.521.6:575.11
**Yellows-resistant varieties of cabbage in the early and midseason roundhead groups.**
Circ. U.S. Dep. Agric. 1948 : No. 775 : Pp. 20.

The breeding of new cabbage varieties resistant to yellows [*Fusarium oxysporum* f.

*conglutinans* (Wr.) Snyder and Hansen] by the Wisconsin Agricultural Experiment Station and the United States Department of Agriculture since 1910 is reviewed. It was found that there were two types of inherited resistance to yellows, one, known as B, inherited as a quantitative character and controlled by an undetermined number of genes, and the other known as A, inherited as a qualitative character and controlled by a single gene, *R*, which is completely dominant to the gene for susceptibility, *r*. Type A is the more satisfactory since it is not affected by temperature and host nutrition as B is.

Five yellows resistant varieties into which the A type has been incorporated are described in this circular, data being presented from trials in which they have been compared with the standard Golden Acre and Glory of Enkhuizen. The five varieties are Marion Market, Globe, Racine Market, Resistant Detroit and Wisconsin Golden Acre.

2534. 635.34.00.14(48.5)
LAMM, R. 635.34:575.12:635.346(48.5)
Lokala sort- och stamförsök med kålväxter under åren 1939–1941. **(Local variety and strain trials with brassicas during 1939-1941).**
Berätt. Alnarps Landtbr.- o. MejInst. 1943 (1944) : 1–41.

The conditions (localities, soils, weather, etc.) and methods of experimentation and statistical evaluation, and the results obtained in variety trials of white, red and savoy cabbages and also of cauliflowers and Brussels sprouts are recorded. Difficulty in regard to seed supplies during the war sometimes made it impossible to obtain the same first class strains of seed of the different varieties.

Alnarps Kål I/38 [Alnarp Cabbage I/38] is a medium late savoy, obtained by crossing a white cabbage and a savoy, and regarded as the best of the savoys tested; it is high yielding and can be stored for a time.

The red cabbages included the early Haco, the medium late Kissendrup and the late A. Hansens Vinter [A. Hansen's Winter].

Among the late Brussels sprouts, Alnarps Stam [Alnarp Strain] is a new variety of excellent quality obtained from a cross of Odense Torg [Odense Market] and Fest und Viel. It is not yet on the market and its name is therefore only provisional.

2535. NILSSON, F. 635.35–1.531.12:578.08(48.5)
Fröodlingsförsök med blomkål 1942–1944. **(Seed production experiments with cauliflower 1942-1944).**
Försök och Forskning 1947 : **4** : 94–95.

The paper deals with successful methods used in obtaining seed from the variety Stor Dansk II/42 [Large Danish II/42] in Sweden.

2536. CHATTERJEE, D. 635.61/3:582(54)
**A new genus of Cucurbitaceae.**
Kew Bull. 1947 : No. 2 : 119–21.

The genus *Indofevillea* is described as a fourth genus of *Cucurbitaceae* endemic to India, the others being *Biswarea* Cogn., *Edgaria* C. B. Clarke and *Dicaelospermum* C. B. Clarke. The species *I. khasiana* represents the new genus.

2537. BEHR, L. 635.61:581.142:581.04:576.356.5
Die Wirkung übernormaler Dosen des Beizmittels "Ceresan" auf den Keimvorgang von *Cucumis sativus* L. **(The effect of excess doses of the dressing agent "Ceresan" on the germination of *C. sativus* L.)**
Züchter 1946 : **17/18** : 44–50.

When seeds of *Cucumis* are treated with over-doses of Ceresan anomalies in the course of germination occur, e.g. tumour formation and ageotropic growth of roots, the tumours frequently containing two nuclei; these phenomena are specific for the Cucurbitaceae and may be interpreted as due to polyploidization.

Seeds of Gramineae, Papilionaceae, Cruciferae, Chenopodiaceae and Compositae, on treatment with similar doses of Ceresan, reacted only by forming shorter and thicker radicles and coleoptiles or hypocotyls; the germination process of *Allium Cepa* seemed to be unaffected. E. W.

2538. 635.615:576.16

Pangalo, K. I. 635.615:582

**(Taxonomy and evolution of the genus *Citrullus* Forsk.).**

Bjulleten̆j Moskovskogo Obščestva Ispytateleĭ Prirody (Bull. Soc. Nat. Moscou) 1945 : **50** : Nos 5–6 : 80–90.

As a result of extensive investigations of a collection of some 4000 representatives of the genus *Citrullus* the author has come to the conclusion that the species *C. ecirrhosus* Cogn. should be included in the species *C. colocynthis* but that the table and fodder forms of *C. vulgaris* should be classed as separate species, *C. edulis* Pang. and *C. colocynthoides* Pang. (non Schweinf.), diagnoses of which are given in Russian and Latin. Details are given of the geographical distribution of the species. Some of the wild forms of *C. colocynthoides* obtained from Kalahari in the African desert have certain characteristics resembling both *C. edulis* and *C. colocynthis*, but since they do not resemble any of the artificially produced interspecific hybrids they are considered to be relics of primitive evolutionary forms of these two species, which at one time apparently occupied much larger areas than the present-day derivatives. A still earlier relic form, which combines characteristics of two distinct genera, *Citrullus* and *Cucumis*, is the Indian species *Citrullus fistulosus*, which possesses many of the characters which distinguish the melons from the water-melons, including the chromosome number of the melon, $n = 12$. This is thought to indicate that the genus *Citrullus* had its origin in the tertiary period before the African continent became separated from India.

2539. Krevčenko, L. E. 635.615:578.08:581.48

**(Seed extracting machine for water-melon).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 67–68.

A simple machine for extracting the seeds from water melons in seed production work is described.

2540. Epps, J. M. 635.615–2.484–1.521.6:575(73)

**A new wilt resistant watermelon.**

44th Proc. Ass. Sth. Agric. Wkrs. Miss. 1947 : 180–81.

A new *Fusarium* wilt resistant water-melon is being released by the West Tennessee Experiment Station under the name of Miles. It has been developed from a cross between Dixie Queen and Klondike. The average weight of the melon is 25 lbs. The fruit is of high quality, and has tough rind and small white seeds. In growers' trials the variety has given a satisfactory performance.

2541. Slugina, A. F. 635.62:581.48(47)

**(Naked seeded gourd).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : p. 69.

A gourd with seeds having a soft seed-coat and an oil content of 43·2 to 45·8% has been selected. It ripens somewhat later than *Cucurbita Pepo* but well before *C. maxima.*

2542. Mao, Hsing-Han 635.62:582(51)

**(A systematic study of *Cucumis Melo* L. in Lanchow).**

J. Agric. Ass. China 1947 : No. 185 : p. 4.

The following varieties of *C. Melo* have been identified in Lanchow on the basis of differences in several characters: vars *recticulatus* Naud., *saccharinus* Naud., *makuwa* Makino, *Dudiam* Naud., *pseudo-cantalupensis* Mao and *lanchowensis* Mao. The two last named are new varieties.

2543. Pal, B. P. and 635.627:575.125(54)

Singh, H. 635.646:575.125(54)

**Studies in hybrid vigour. II. Notes on the manifestation of hybrid vigour in the brinjal and bitter gourd.**

Indian J. Genet. Pl. Breed. 1946 : **6** : 19–33.

Hybrid vigour was studied at the Indian Agricultural Research Institute, New Delhi, in several intervarietal hybrids of egg plant with regard to seed germination, plant height, spread, height x spread value, number of branches, flowering, number of fruits, size of mature fruit and yield. Some crosses exhibited pronounced hybrid vigour. The cross Muktakeshi x Clustered White (T.13 x T.17) was considered to be the best from the economic point of view, and has been subjected to trial under the name Pusa Purple during the period 1943–46. It has given a good performance at a number of locations, particularly in the United Provinces, Bihar and Bengal.

Heterosis was investigated in intervarietal crosses of the bitter gourd (*Momordica charantia*), with regard to number of male and female flowers, interval between the appearance of the first male and female flowers, length of main shoot, number of fruits, size of mature fruits and yield. Marked hybrid vigour was observed in certain crosses.

2544. Tkačenko, N. M. 635.63:581.162.32
**(Spatial isolation of cucumbers).**
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 66–67.

Plots of the Nežinskiĭ cucumber, which has pale lemon-yellow flowers, were grown at Krasnodar at different distances from the ordinary orange-flowered forms. An examination of the number of yellow-flowered plants in the progeny showed that at a distance of 180–200 m. the amount of cross-pollination was 0·1% and at 400 m. was nil. An isolation distance of 400–500 m. is therefore considered adequate for the Ukraine.

2545. 635.64(41+42)
**Tomatoes. Cultivation, diseases and pests.**
Bull. Minist. Agric., Lond. 1948 : No. 77 : Pp. 67.

This bulletin, originally published in 1934, has been extensively revised, and incorporates the results of recent cultural experiments at Cheshunt Experiment and Research Station and elsewhere. Advice is provided on the various aspects of tomato production in Great Britain. Notes are given on varieties, including the leaf mould resistant varieties, Vetomold, V 121 and Leaf Mould Resister No. 1, which are recommended for glasshouse cultivation. The varieties Harbinger, Market King, Hundredfold, Early Market and Potentate are mentioned as generally suitable for growing in the open.

2546. Andrus, C. F. 635.64:575(73)
**Some tomatoes get step'd on!**
Sth. Seedsman 1948 : **11** : No. 6 : 18, 63.

The varietal testing work of the co-operative Southern Tomato Exchange Programme (STEP) organized by several experiment stations in the Southern United States is described. There are two classes of trials: (1) the observation trials, with Rutgers used as the standard of comparison, and (2) the replicated or yield trials which include only the few lines selected in the observation trials of the previous year. Particular attention is given to new varieties not yet released to seedsmen, and all entries are grown at a large number of locations in the same year. STEP 10 from Arkansas and STEP 22 developed by the Regional Vegetable Breeding Laboratory may be commercially released in the near future; both are midseason, *Fusarium* wilt resistant types, which are believed to have a wide range of adaptation.

2547. Mullett, R. A. 635.64:575(94)
**Horticultural Research Station, Scoresby. Tomato Field Day.**
J. Dep. Agric. Vict. 1948 : **46** : 207–08.

Tomato improvement at the Horticultural Research Station, Scoresby, Victoria, is outlined. Selection of South Australian Dwarf has resulted in an improved variety, named Victorian Dwarf.

By crossing San Marzano with Burwood Prize, a variety has been produced which appears to be immune from blossom end rot.

Promising strains of Orange Prolific have been isolated.

A thick-skinned type of Tatura Dwarf Globe has been selected which appears to be considerably less susceptible to the cracking and splitting marring the parent variety.

A cross between Break o' Day and King Humbert has resulted in a variety of the Grosse Lisse type, which should prove useful for late marketing and artificial ripening.

The development of early varieties for districts of the Murray Valley is in progress; Yellow Top is being used as a parent in hybridization.

Two introductions of the English cluster type, viz. Stoner's Exhibition and Scarlet Eclipse, are considered to be valuable as tomatoes for late marketing and artificial ripening.

2548. Baldoni, R. 635.64:575.125(45)
Esperienza sull'utilizzazione dell'eterosi nella coltivazione del pomodoro.
**(Utilization of heterosis in tomato cultivation).**
Ann. Sper. Agrar. Roma 1948 : **2** : 3–20.

Crosses were made in 1946 between contrasting pairs of varieties as follows: S. Marzano x Costoluto, S. Marzano x Tondo Liscio [Smooth Round], Pancrazio x S. Marzano and Costoluto x Pancrazio. An average set of about 40% was obtained and since an experienced worker can make about 100 pollinations a day and each fruit contains about 100 seeds, it is calculated that one worker would require some 12 days in order to produce enough seed to plant one hectare.

The greater yield increases were observed in the hybrids from the most dissimilar varieties. The hybrids of S. Marzano x Costoluto yielded 17·7% more fruit than the more productive parent and 32% more than the average of the parents. In the cross S. Marzano x Tondo Liscio the yield was 32% more than the better parent. However, the former is thought to be the best combination for commercial purposes because of the ease of fertilization.

The number of fruits per plant was greater in the hybrids, the difference varying from 60 to 290%; the fruit size was generally intermediate between the parents, though tending towards the smaller, but in the cross Costoluto x Pancrazio the fruits were so small as to be useless. A small preliminary experiment with intravarietal crossing in the variety Piastro showed an increase in number and yield of fruits with no reduction in size.

All hybrids showed a more even ripening of the fruits throughout the season, without a marked peak period as observed in the parents.

2549. Petrosini, G. 635.64:577.16(45)
Sopra il contenuto vitaminico dei vegetali: ricerche sui pomodori.
**(The vitamin content of plants : studies on tomatoes).**
Quaderni Nutrizione, Napoli 1948 : **10** : No. 3 : 1–9.

Investigations have been started with tomatoes similar to those already carried out with sweet pepper (cf. Abst. 2409). The results are similar but the total vitamin C content in tomatoes is much lower than in the peppers and varietal differences are less evident.

2550. 635.64:581.162.51:575.11
Raever, W. E. 635.64:575.125:578.08
**A promising type of male sterility for use in hybrid tomato seed production.**
Science 1948 : **107** : p. 506.

A mutant of the tomato variety John Baer is reported in which natural selfing is prevented by the failure of the anthers to dehisce but which can be selfed by hand pollination. The character appears to behave as a simple recessive. It is suggested that in view of the labour which is saved by the use of plants of this type, the incorporation of the "sterility" character into other desirable parent lines would materially reduce the cost of hybrid seed production. Improvements in pollen collection methods should also help towards this end.

2551. Doolittle, S. P. 635.64–2–1.521.6(73)
**Tomato diseases.**
Fmrs' Bull. U.S. Dep. Agric. 1948 : No. 1934 : Pp. 82.

The bulletin includes mention of tomato varieties resistant to *Fusarium* wilt, *Verticillium* wilt, *Alternaria*, *Cladosporium fulvum*, spotted wilt virus and other diseases.

2552. Aberdeen, J. E. C. 635.64–2.3–1.521.6(94.3)
**Experiments in the control of bacterial wilt of tomatoes in south-eastern Queensland.**
Bull. Dep. Agric. Qd 1946 : No. 30 : 1–5.

Experiments on the control of bacterial wilt of the tomato in south-eastern Queensland included varietal resistance trials. Among the varieties and strains tested were strains of Louisiana Pink and Carolina Cross, introduced from North Carolina, and already selected for resistance to the disease. Break o' Day, which is widely grown locally, proved very susceptible. Sensation, Marvel, Louisiana Pink No. 1 and Carolina Cross No. 2 gave good results. The Australian variety Sensation, however, is not wholly satisfactory from the commercial point of view, since it requires trellising and pruning to encourage the development of good-sized fruits and possesses undesirable internal fruit characteristics. The fruit type of Louisiana Pink and Carolina Cross shows an improvement over that of Sensation, but further improvement of strains of these varieties would be required before they could be placed on the commercial market.

2553. LESLEY, J. W. and
MIDDLETON, J. T. 635.64–2.484–1.521.6:575(79.4)
**New variety of canning tomato recommended for trial where *Verticillium* wilt is serious.**
Calif. Agric. 1948 : **2** : No. **3** : p. 15.

The *Verticillium* wilt resistant variety Simi is recommended for trial in the Simi valley and other coastal districts of California as a canning tomato. In 1939 a cross was made between Riverside and North Dakota 216 2–3; an $F_3$ plant was crossed with a plant originating from an $F_2$ selection back-crossed with Riverside. Selection was made for *Verticillium* wilt resistance, large fleshy fruit, the minimum of white core, and high yield; selfing for seven generations resulted in the production of Simi. In tolerance to *Fusarium* wilt the new variety is probably similar to Pearson.

*Lycopersicon hirsutum* and *L. peruvianum* are now being used in an attempt to breed a variety with still greater *Verticillium* wilt resistance.

These investigations are reported from the Citrus Experiment Station, University of California, Riverside.

2554. HUTTON, E. M.,
MILLS, M. and
GILES, J. E. 635.64–2.484–1.521.6:575(94)
**Fusarium wilt of tomato in Australia. 2. Inheritance of field immunity to fusarium wilt in the tomato (*Lycopersicon esculentum*).**
J. Coun. Sci. Industr. Res. Aust. 1947 : **20** : 468–74.

A study of crosses of standard tomato varieties with Pan America has shown that the latter variety is valuable as a means of breeding for field immunity to *Fusarium* wilt in Australia combined with good commercial characters. The results also show that hybridization with Pan America may lead to improved vitamin C content.

In the $F_1$ field immunity is completely dominant to susceptibility. In the $F_2$ generation a preponderance of field immune segregates was obtained, so that the expected 3 : 1 ratio was exceeded. In all the crosses studied the field immune tomatoes, Pan America and selection 42–50–6 (from a cross between *L. pimpinellifolium* and Marglobe received from the United States), were used as male parents. G. W. Bohn and C. M. Tucker in earlier work noted that in a number of cases a higher proportion of immune progeny than was expected occurred in crosses in which the *Fusarium* wilt immune parent was the male (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 903); they suggested that the factor for immunity is linked with a factor influencing the effectiveness of the microgamete. In the present investigations it was observed that the preponderance of the factor for field immunity was more marked in hybrids involving 42–50–6 as a male than those in which Pan America formed the male parent. Some indication was also obtained that different susceptible female parents may influence the number of field immune progeny in crosses with field immune pollen parents, suggesting the presence of modifying factors.

A discussion is given of the possible value of multiple crosses involving Pan America as a parent at least twice.

In selecting segregates for field immunity to *Fusarium* wilt, it has been found that agronomic field selection should be supplemented by inoculation tests in the greenhouse, as it is inadvisable to rely on selection for immunity under conditions of field infection on account of the considerable influence of environmental conditions upon the development of the disease.

2555. 635.64–2.484–1.521.6:575.127.2:575.11
LANGFORD, A. N. 635.64–2.8–1.521.6:575.127.2:575.11
**Autogenous necrosis in tomatoes immune from *Cladosporium fulvum* Cooke.**
Canad. J. Res. 1948 : Sect. C : **26** : 35–64.

The occurrence is reported of a non-parasitic and destructive necrosis in tomato lines carrying the factor $Cf_{p1}$, for immunity to physiological races 1 to 4 of *C. fulvum*, derived from *Lycopersicon pimpinellifolium*. It has been established that immune plants, carrying the factor $Cf_{p1}$, are potentially necrotic if they are homozygous for the factor *ne*, derived from *L. esculentum*, but do not develop necrosis if homozygous or heterozygous for the dominant allele *Ne*, derived from *L. pimpinellifolium*. Plants susceptible to *C. fulvum* are invariably non-necrotic.

The $F_2$ generations of all crosses between *L. pimpinellifolium* and different varieties of *L. esculentum* showed a segregation of immune individual plants into non-necrotic and necrotic individuals.

The results of linkage tests revealed that *ne* is located on chromosome I near the locus *s* for compound inflorescence, distal to the loci $d_1$, *p* and *o* for dwarf stature, peach fruit surface and elongated fruit, respectively.

Evidence has been obtained indicating that modifying factors are present in *L. pimpinellifolium* which weaken the necrotic expression of *ne ne* in the presence of $Cf_{p1}$. In addition, one or more factors located in chromosome VII and closely associated with the gene *H* for smooth stem occurring in *L. pimpinellifolium* may prevent the development of necrosis in immune plants of the genotype *ne ne*; further experiments are required to elucidate the nature of this genetic behaviour.

The effect of environmental conditions upon the expression of necrosis was also studied. Light intensity and temperature were found to exert a marked effect upon the degree to which the necrosis developed.

Necrosis is considered to be the expression of incompatibility between $Cf_{p1}$, derived from *L. pimpinellifolium*, and a chromosome complex largely derived from *L. esculentum*. The possible mode of evolution in *L. pimpinellifolium* of immunity from *C. fulvum* and of freedom from necrosis is discussed. The problem of breeding for immunity from *C. fulvum* is also examined, with particular reference to the occurrence of new strains attacking the commercial tomato variety Vetomold, which is immune from races one to four, and to the additional complications of autogenous necrosis.

2556. HOLMES, F. O. 635.64–2.8–1.521.6:575(74.9+96.9)
**Resistance to spotted wilt in tomato.**
Phytopathology 1948 : **38** : 467–73.

The tomato variety Pearl Harbor and its derivatives recently developed in Hawaii (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 986), proved susceptible to a strain or strains of the spotted wilt virus occurring in a small area of southern New Jersey during 1946. The variety Rey de los Tempranos [King of the Earlies] and selections of the variety Manzana [Apple] from Argentina were found to be resistant under conditions of natural and artificial infection. $F_1$ hybrids of crosses of Rey de los Tempranos with the susceptible varieties Rutgers, Bounty and Bonny Best appeared to be intermediate between the parental types in reaction to inoculation. The data from the $F_2$ of the cross with Rutgers suggest that the type of resistance in question is inherited as a recessive character depending upon a single gene difference.

The varieties Rey de los Tempranos and Manzana were exposed to natural spotted wilt infection at the Agricultural Experiment Station, Hawaii. They appeared to be less resistant than the locally adapted Pearl Harbor, but more resistant than the susceptible varieties Rutgers and Bounty. It is thought that it might be valuable to combine the two types of resistance by hybridization.

2557. 635.64–2.8–1.521.6:575.127.2(73)
**Tomato blight still unwhipped.**
News Lett., Idaho 1948 : **32** : No. 3 : p. 2.

R. D. Watson is quoted as expressing confidence that experiments now in progress will eventually lead to the combination of the high resistance or immunity to curly top of wild South American tomato varieties with the desirable qualities of commercial varieties. Some particulars about the disease and its control are also given.

2558. SHEN, L. Y. 635.651:581.162.32(51)

**(A study of natural crossing in *Vicia Faba*).**

J. Agric. Ass. China 1947 : No. 185 : p. 8.

Under field conditions at Chengtu, Szechwan, the average percentage of natural crossing in broad beans was 24%. The crossing was found to be chiefly caused by bees rather than by wind. An isolation distance of 5 km. is recommended. The percentage of natural crossing probably varies with variety.

2559. 635.652:575.11.061.1

LAMPRECHT, H. 635.652:576.16

**The inheritance of the slender-type of *Phaseolus vulgaris* and some other results.**

Agri Hortique Genetica, Landskrona 1947 : **5** : 72–84.

A review is given of the results of genetical analysis of the slender type with unusually long internodes in *Pisum sativum* reported by Rasmusson, De Haan, Lamm and the author. In general it has been suggested that the character of slender type depends upon two gene pairs in the homozygous recessive condition. The author has proposed the symbols *cry cry* and *la la* for these pairs.

A study of a cross of two dwarf varieties of *Phaseolus vulgaris* has revealed the genetic basis of the character of slender type as similar to that in *P. sativum*. The same symbols are used to designate the genotype concerned, viz. *cry cry la la*. When either of the dominant genes *Cry* and *La* is present, the growth of unusually long internodes does not occur.

In the same cross the segregation of eight other genes was analysed, viz. *Arg*, *Y*, *Ea*, *Fb*, *C*, *B* and $V_{1ae}$. Linkage was found between the gene *Fb* for parchment pods and the gene *Ea* conditioning the shape of the pod as shown in transverse section, with a cross-over value of 12·15 ± 2·46%.

It is considered that, as in the case of *P. sativum*, a number of polymeric genes exist in *Ph. vulgaris*. The genes *Fb* and *Fc*, *Ea* and *Eb*, *Da* and *Db*, *Cry* and *La*, *J* and *Ins*, and *G* and *Can* are cited as polymeric genes in the bean.

"The occurrence of polymeric genes is here—as in *Pisum* and generally—considered as evidence that *Ph. vulgaris* cannot be a primary species but may descend from a tetraploid *Ph. vulgaris* by loss of one or more chromosomes". A similar origin is also suggested for *Ph. coccineus*, since it differs from the latter species only in two interspecific alleles.

The segregation of the slender type and of the genes *C*, *B*, *Arg*, *Ia* and *Fin* was investigated in a cross between a dwarf variety and tall variety of *Ph. vulgaris*. The factor *Fin* determines tall or infinite growth of the plant axis, while plants of the genotype *fin fin* show finite or dwarf growth. $F_2$ plants carrying the factor *Fin* possessed internodes varying from long to medium long. It was not possible to classify this group of plants with regard to the effect of *Cry* and *La*. The slender type could only be recognized in the group of plants of the constitution *fin fin*; within this group segregation occurred according to the ratio 15 dwarfs: 1 slender. No linkage was found between any of the genes under analysis in the $F_2$ of this cross.

2560. 635.652–2–1.521.6:575(77.4)

DOWN, E. E. 635.652:575.243"793":537.531(77.4)

**Bean breeding problems listed by plant expert.**

Michigan Bean Bull. 1948 : **11** : 16–17.

The bean varieties Robust and Michelite are discussed. The latter variety was introduced in 1938 (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 1242). It possesses the disease resistance of Robust to mosaic and bacterial wilt, a white seed coat and early maturity, and its pods are more uniform in size and shape than those of Robust. At the present time 90–95% of the bean acreage in Michigan is planted with Michelite; in some areas, however, Robust is still considered as the better variety. The need for detailed information on the performance of bean varieties is stressed. In breeding work, more attention should be given to disease resistance, particularly joint blight. The attempt should also be made to develop a variety that holds its pods off the ground, and an earlier bean than Michelite. The apparent association between mosaic susceptibility and extreme earliness has offered difficulties in breeding for an earlier type. But an early bean has been recently developed at the Michigan State College by treating Michelite with X-rays. This strain has been crossed with Robust and Michelite; selection is now in progress.

2561. GROGAN, R. G. and
WALKER, J. C. 635.652–2.8:576.16:631.521.6(77.5)
**Interrelation of bean virus 1 and bean virus 2 as shown by cross-protection tests.**
Phytopathology 1948 : **38** : 489–93.

By using the differential reaction to bean virus 1 and bean virus 2 in the bean varieties Stringless Green Refugee 1066, virus 1 was found to be capable of immunizing beans against infection with virus 2, likewise virus 2 partially or entirely immunized beans against virus 1. Virus 2, which so far has not been found to be seed borne, reduced the amount of seed transmission of virus 1, and also reduced the amount of systemic necrosis caused by virus 1 on certain resistant varieties. Previous workers have shown that the two viruses are similar in dilution end point, thermal inactivation and longevity in vitro, and differ only in the symptoms produced, seed transmission and host range. The fact that they effectively cross-protect each other provides further evidence of their close relationship.

2562. PRICE, W. C. and
HOLT, B. R. 635.652–2.8–1.521.6:578.08(74.8)
**Kentucky Wonder bean plants as hosts for measuring southern bean mosaic virus activity.**
Phytopathology 1948 : **38** : 213–17.

Previously the bean variety Early Golden Cluster has been used in determinations of the relative activity of the southern bean mosaic virus (*Marmor laesiofaciens* Z. et H.). But owing to the fact that in the last two years seed of this variety has been unobtainable from commercial seed firms, it has been necessary to find another bean variety suitable as a test host. Experiments on Kentucky Wonder Wax and Kentucky Wonder Green Pod are described; both these varieties carry the dominant gene for the local lesion response (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 1044). The numbers of necrotic lesions produced on plants of both varieties when inoculated with a series of dilutions of the virus, were found to correspond with an equation based upon the assumption that the virus particles are aggregated and the probability of obtaining infection is related to the probability of the occurrence of a single infectious particle in a unit volume of inoculum. According to this equation over a certain range the logarithm of the number of lesions is very nearly a linear function of the logarithm of the virus concentration. The experimental data showed a close correspondence with the theoretical curve. The results indicate that Kentucky Wonder varieties of bean are suitable test plants for use in the determination of the activity of Southern bean mosaic, involving comparison of two dilutions of the unknown virus preparation with two dilutions of a standard.

2563. 635.655(73)
**Recommended varieties.**
Soybean Digest 1948 : **8** : No. **6** : p. 19.

The most satisfactory soya bean varieties adapted to the different States, and recommended by the state experiment stations and the U.S. Regional Soybean Laboratory are indicated on a map.

2564. MCDOWELL, B. 635.655(73)
**S-100—new Cotton Belt bean.**
Soybean Digest 1948 : **8** : No. **7** : p. 20.

An account is given of the new medium late soya bean S–100, developed at the University of Missouri (cf. Abst. 1954).

2565. SPOONER, H. A. 635.655:575(73)
**Harvest-at-leisure soybean.**
Sth. Seedsman 1948 : **11** : No. 6 : 22, 42.

The new soya bean Yelnando has been developed by Coker's Pedigree Seed Co., Hartsville, S.C., from a natural cross between Yelredo and Nanda. Its chief advantage is a high degree of resistance to shattering. The variety produces good yields of hay and medium-sized grain, the average oil content of the seed being 17–18%. Yelnando is medium late in maturity, and considered to be widely adapted in the southern United States.

2566. WANG, S. and
SHIN, C. I. 635.655:575.125(51)
**(A study of hybrid vigor of soybeans).**
J. Agric. Ass. China 1947 : No. 184 : 1–2.

Hybrid vigour in $F_1$ intervarietal soya bean hybrids is reported in the following characters, on the basis of comparison with either parent: plant weight, number of branches, weight of pods per plant, number of seeds in pods, number and weight of seeds per plant, weight of 100 seeds, and general vigour.

2567. WILLIAMS, L. F. 635.655:575.127.2:575
**Inheritance in a species cross in the soybean.**
Genetics 1948 : **33** : 131–32. (Abst.)

The inheritance of several characters was studied in crosses between the cultivated soya bean and the wild species *Glycine ussuriensis*. Seed size was found to be geometric in inheritance. Neither the large seed size of the cultivated soya bean nor the small seed size of the wild species was recovered in the $F_2$ or first back-cross generations; in the second back-cross generation and the first back-cross generation selfed the seed size of the cultivated species forming the recurrent parent was recovered. The percentage oil content showed an intermediate inheritance in the $F_1$, but the high and low oil contents of the cultivated and wild species, respectively, were not recovered in the $F_2$ generation. The protein content of the $F_1$ was close to the high value of the wild parent; some $F_2$ segregates possessed an even higher protein content. The $F_1$ generation showed the prostrate and vining habit of the wild species; the erect habit of the cultivated parent was not recovered in the $F_2$ or $F_3$, or first back-cross. In maturity the $F_1$ was usually intermediate, but transgressive segregation in the $F_2$ in respect to the maturity of both parents was observed. The majority of the strains of the wild species appear to differ from the cultivated soya bean in chromosomal arrangement; the $F_1$ hybrid generation produced approximately 50% abortive pollen and ovules; certain plants of strain T106, however, gave normal pollen and ovules in crosses with the cultivated soya bean. It appears that the wild species carries the gene *G* for green seed coat as opposed to yellow seed coat, but the black coat of the wild soya bean obscures the expression of this gene.

2568. RODRÍGUEZ, J. P. 635.655.00.14(72.95)
**Soybean trials in Puerto Rico.**
Bull. P.R. Agric. Exp. Sta. 1947 : No. 74 : Pp. 17.

A report is given of regional trials of soya bean varieties for grain and forage yields in Puerto Rico. As a result of these trials, the variety Otootan is recommended for green forage production. Seminole, Otootan and Palmetto gave equally good yields of grain, and outyielded Mammoth Yellow. The quality of the grain of Seminole was, however, the best for the purpose of human consumption as a green vegetable or dry bean.

2569. 635.655.00.15(73)
**A listing of Experiment Station soybean research.**
Soybean Digest 1948 : **8** : No. 7 : 28, 30–33.

Investigations on the soya bean in the United States and the experiment stations where these are being carried out are listed. Breeding and genetics are included.

2570. LJVOVA, P. F. 635.656:575(47)
**(New pea varieties).**
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1947 : **14** : No. 1 : 55–58.

The pink seeded pea Mahndorf Viktoria is the main variety in the Voronež province and green seeded varieties have so far been inferior to it in both yield and quality. Two new hybrids of the Mandorf Viktoria type but exceeding it in yield are described. The first is Hybrid 413, from a cross of Strube's Viktoria x Čerepovec Viktoria. The former parent has a medium-long vernalization stage and a short photo-stage but is not resistant to spring drought, the latter parent is resistant to spring drought but has a long photo-stage. The hybrid ripens within 1–3 days of Mahndorf Viktoria, has equally large seeds and exceeds it by 10–15% in yield.

Hybrid 1061/4 is a cross between Heine's Viktoria and Viktoria Belozernaja [White-seeded Viktoria]. It flowers 2–3 days earlier than Hybrid 413 but is in many ways similar.

A green-seeded hybrid has been obtained by crossing the marrow-fat variety Gradus with Heine's Viktoria. The hybrid is of the Viktoria type but has green seeds which are larger than Mahndorf Viktoria and equal to it in quality and yield. The hybrid is also more resistant to *Ascochyta.*

2571. 635.656:575.11(48.5)
HYLMÖ, B. 635.656.00.14(48.5)
Sortförsök med trädgårdsärter vid Alnarp åren 1934–1942. (**Variety trials with garden peas at Alnarp during the years 1934-1942**).
Berätt. Alnarps Landtbr.- o. MejInst. 1943 (1944) : 53–114.

A full account is given of these trials, the system of testing, and the names of the varieties tested with observations on the available selection of Swedish and foreign varieties in Sweden and on synonyms.

To facilitate the identification of the varieties, the following taxonomic features used in the official control of vegetable seed in Sweden are described with notes on the genetic factors determining them: leaf colour, variegation and shape of stipules, colour, size and arrangement of the flowers, size and colour of seeds, shape, colour and size of pods. Other characters studied were earliness, plant height in relation to yield, disease resistance and the actual yield of peas as distinct from the yield of pods.

Among the varieties approved as first class élite or first class in the official trials, 26 have been produced by Swedish breeders, while 19 are of foreign origin.

Among the flat podded sugar or edible podded peas the following are of interest: the new medium tall Norrland Express O.E./41 showed remarkable earliness and surpassed the formerly popular Norrlands C:s variety in quality and yield; and Dvärg-Sabel/41, a new short, red-flowered pea, with no tendrils and fairly large pods.

The new edible-podded, marrow-fat pea Aurora/41 is medium early, ripening almost at the same time as Riks-Sabel L.D:s/41, which it has equalled in yield.

The earliest marrow-fat pea was Primör/41, an improved line from Electricity. Helios/41, a new Swedish variety, replacing Lincoln which it equals in earliness, has a high yield in spite of the shortness of the plants. Österlen/41, with its waxless upper surface of the leaves, is a little later and shows good quality and resistance to fungous diseases.

Balder W:s/41 is remarkable for its high percentage of seeds.

Juvel L.D:/41 should be re-classified as a low-growing, and not a medium-tall type.

2572. LAMPRECHT, H. 635.656:575.11.061.6
Die Testafärbung von *Pisum*-Samen und ihre Vererbung. (**The inheritance of the seed coat colour of *Pisum***).
Agri Hortique Genetica, Landskrona 1947 : **5** : 85–105.

The mode of action of the 19 genes so far described which affect testa colour in *P. sativum* is described. These genes are classified into six groups: (*a*) basic genes whose presence is essential for any type of pigmentation in the testa, (*b*) colour genes, (*c*) colour modifiers, (*d*) genes controlling the distribution of colour in the testa, (*e*) genes determining pigmentation in some particular part of the testa, and (*f*) genes causing pigmented marks to appear.

A new gene *Lob* is described, which influences, in conjunction with *Dem* and *Cal*, the distribution of the colour pattern of seeds carrying the genes *A z mp*. It proved possible to distinguish *A z mp Dem lob* seeds carrying *Cal Cal* from the heterozygotes carrying *Cal cal*, by means of the different pigmentation patterns expressed. No linkage could be detected between *Lob* on the one hand, and *Le*, *St*, *Bt*, *B*, *M* and *I* on the other.

A coloured stripe arising near the caruncle and passing down the back of the seed has been observed in some individuals. It is possibly caused by *gri.*
A new pigmentation pattern termed *ventriosus* is also reported.
A yellow ochre ring around the hilum is caused by the recessive gene *cor*, possibly an allelomorph of *Gl.*

2573. 635.656:575.127.2:576.356.2:582
LAMPRECHT, H. 635.656:575.11(51.5)
Die Beziehungen zwischen *Pisum tibetanicum* und *sativum* im Lichte von Kreuzungsergebnissen. **The relation between *P. tibetanicum* and *sativum* in the light of results of hybridization).**
Svensk Bot. Tidskr. 1944 : **38** : 365–80.

Three lines of *P. tibetanicum* No. 611, 612 and 613, obtained from three different localities in Tibet, were crossed with lines obtained from crosses of European cultivated varieties of *P. sativum*, in order to detect any aberrations in the chromosome structure or genotypic constitution of the Tibetan forms. A study of the fertility in the crosses showed that lines 611 and 613 from Eastern Tibet contained a simple, i.e. not reciprocal, translocation, while line 612 was normal in its chromosome structure.

Some of the results of other investigators of *Pisum* material from Tibet are briefly reviewed and it is pointed out that the occurrence, in a wild population of an obligate self-fertilizing plant, of types differing in chromosome structure is of interest as indicating *inter alia* that environment in the region in question has not ensured, by natural selection, the predominance of a particular structural type. Possibly the climate and solar radiation in Tibet vary annually so much that gene mutations and structural translocations may be induced. Moreover, in *Pisum*, generally speaking, stability of a particular structural type is to a certain extent related to the genotype constitution (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 255). The cultivated varieties of *P. sativum* belong mainly to the normal type, though genetic experimentation during the last 15 years has revealed a number of structurally different chromosome types and different degrees of sterility corresponding to simple or reciprocal translocations or various translocations between three chromosomes. In view of these findings the author now regards *P. abyssinicum*, *P. asiaticum*, *P. elatius*, *P. Puschki* and *P. tibetanicum* all as geographical races of *P. sativum*; and he thinks it probable that in most, if not all, of these races structural differences in the chromosomes of a similar type to those recorded above also occur.

In the genetical analysis of crosses of the Tibetan lines with *P. sativum*, the segregation and linkage data indicated that except when translocations have occurred, the arrangement of the genes in the chromosome of *P. tibetanicum* is the same as in varieties of *P. sativum.*
The Tibetan lines differed from all varieties and races of *Pisum* known to the author by having the macula represented by an anthocyanin in the axis between the stem and petiole.

2574. HEINZE, P. H.,
HAYDEN, F. R. and
WADE, B. L. 635.656:577.16(75.7)
**Vitamin studies of varieties and strains of peas.**
Plant Physiol. 1947 : **22** : 548–60.

The results are presented of determinations of the thiamin, riboflavin, ascorbic acid and carotene contents of different varieties of garden peas. Significant varietal differences were found for all four vitamins. The differences in thiamin content between different varieties and breeding lines are important from a nutritional standpoint and merit attention in breeding work especially as they are relatively consistent in different years.

2575. 635.67:575"793"(74.6)
635.67:575.12(74.6)
**New sweet corn hybrid to fill out ripening succession.**
Sth. Seedsman 1948 : **11** : No. 4 : p. 70.

A note is given on the new hybrid sweet corn Grant, developed by W. R. Singleton at the Connecticut Agricultural Experiment Station, and to be released in 1948. It ripens at a time intermediate between the harvesting dates of Carmelcross and Lee, and has good quality. All these hybrids can be planted at the same time to provide a continuous harvest season. The ears of Grant are large; the hybrid is therefore recommended for the domestic garden and fresh market, but not for canning.

2576. Brunson, A. M. and
Smith, G. M. 635.677(73)
**Popcorn.**
Fmrs' Bull. U.S. Dep. Agric. 1948 : No. 1679 : Pp. 18.

The bulletin gives information on popcorn hybrids and varieties in the United States, cultural practices, harvesting, drying, storage, determination of moisture content as a standard of commercial quality, determination of popping expansion, and marketing.

2577. 635.9:575.12:576.312.35
Fagerlind, F. 635.9:581.162.32:576.16(48.5)
Försök att framställa nya parkros-sorter. (**An attempt to produce new varieties of "park roses"**).
Förening. Dendrol. Parkvård Årsb., Lustgården 1946 : 13–32.

The writer has conducted experiments in Sweden for six years on the pollination and hybridization of roses of different types, primarily with the object of studying crossability in the genus *Rosa*, and the factor complex that determines species formation and delimitation. Crosses were also made with a view to the production of varieties with hips with a high vitamin C content and other features that would render them suitable for mass production for industrial purposes. This latter problem was studied in collaboration with the A.-B. Kärnbolaget [Grain Company Ltd.] in Stockholm. The production of new ornamental types was a further objective.

The paper, which is illustrated with coloured plates, gives a full account of the various crosses tried and the resulting hybrids. The cytological aspect is considered with special reference to the chromosome numbers and to meiosis in the section Caninae.

# BOOK REVIEWS

576.12
576.16:582

ROZANOVA, M. A.
**(Experimental bases of plant systematics).**
Akademija Nauk S.S.S.R., Otdelenie Biologičeskih Nauk. (U.S.S.R. Acad. Sci., Sect. Biol. Sci.) Moscow-Leningrad **1946** : **Pp. 255.**

In this review of the species problem the author points to the many inconsistencies in the evolutionary systems drawn up on the basis of a purely morphological approach to systematics, and shows how this situation has led a great number of investigators to approach the subject from other angles; genetics, cytology, biochemistry, physiology, and mathematics have all had their part. In the Soviet Union the subject has been treated from an essentially practical angle, the object being to bring some sort of order into the immense mass of material collected and made available to the plant breeders in recent years in nearly all cultivated plants.

The various fields of investigation that have contributed to modern systematics are reviewed. The first chapter deals with biochemistry; allied chemical compounds are found in related forms, though many exceptions to this are also cited. The more complex compounds tend to be more specific than the simpler ones. The actual content of any given compound varies with climatic conditions but some plants are more constant in their chemical composition and others are more variable. The lower plant groups contain less complex compounds and the complexity increases gradually in the higher groups, but any more detailed evolutionary tendencies than this cannot at present be detected.

In the second chapter questions of immunity and serological reactions are examined. The different types of immunity and the factors which affect them are analysed. The reaction of a plant to parasites, especially the more specialized ones, often corresponds with its systematic position and the data on reaction to parasites may serve as useful supplementary evidence in certain doubtful cases. The same applies to the serological method, which is also described.

The problem of the species is dealt with in chapter 3 and succeeding chapters. In connexion with the origin of species it is emphasized that the role of mutation and of hybridization are inextricably linked, since the one affects the other. The role of amphidiploidy in speciation is illustrated by reference to *Galeopsis*, several grasses and cereal species, *Rosa*, *Rubus*, *Gossypium* and *Crepis*, and the role of partial polyploidy by *Viola*, *Chrysanthemum*, *Fragaria* and *Aegilops*; the role of apomixis is discussed by reference to authors such as Ernst and Winge who regard it as the consequence of hybridization, and others such as Winkler, Holmgren and Gustafsson who regard it as an independent phenomenon. A review is given of the results of various authors who have shown the differences in geographical distribution between diploid and polyploid species; although in general the polyploid forms occupy the areas with the more extreme conditions, a number of exceptions to this generalization are mentioned. The published data on structural chromosome differences and their significance in species formation are next analysed, with special reference to *Datura*, *Oenothera* and *Drosophila*. Finally, a number of cases where specific differences depend on single gene mutations are reviewed.

In discussing the origin of species the author rejects the view represented by Filipčenko, Goldschmidt and certain others, that the higher orders such as species or genera arose by a process distinct from that whereby races and varieties arise. Given the various modes of origin of variation outlined above, the main motive force in the evolution of species is natural selection. Ecological and geographical differentiation is considered first, in connexion with the development of the small groups such as ecotypes, climatypes and their subdivisions, and the results of Turesson are outlined, followed by those of later authors. The parallelism between the ecotypes of different species, noted by Vavilov, has been confirmed in the findings of a number of other workers, though instances of pseudo-parallelism, where a similar morphological type is produced by different conditions, have been noted by the author herself and by others. The importance of investigating a species experimentally, as regards both the genetical and the purely adaptational interrelationships of its various components, is illustrated by reference to the work of Sinskaja with lucerne, the authoress herself with *Ranunculus* spp. and Hiesey, Clausen and Keck with *Potentilla*.

A number of instances where chromosomal differences within a species are also associated with differences in ecological adaptation are also noted; some of these have been definitely shown to be due to autopolyploidy.

In discussing the various factors which go to make up species differences it is shown that a capacity to cross is only of relative value as a criterion of relationship. A genetical and cytological study of the hybrids provides a better guide to the interrelationships, as illustrated by the work of Clausen with *Viola*, Baur with *Antirrhinum*, and Harland and others with *Gossypium*. Actual chromosome numbers sometimes do and sometimes do not correspond to real specific differences; among the latter category a great number of amphidiploid species are referred to. Details of chromosome morphology can often be more informative, as shown particularly in the work of Levitskiĭ and others, though again there are exceptions where the caryological and purely systematic data lead to conflicting conclusions. Evidence drawn from the type of conjugation observed in hybrids is analysed by reference to the data from *Triticum*, *Fragaria* and *Avena*.

The sixth chapter traces the evolution of the species concept from an absolute, unchanging and unchangeable entity to the modern conception of a species as a group of individuals in a fluid state of equilibrium with a constantly changing set of environmental factors, differentiated by ecological and geographical factors, and genetical and physiological factors. Various definitions of a species are criticized and it is concluded that no one definition can serve to cover all the cases. However, the authoress gives her own definition as follows: "A species is a mobile and changing population, in a certain section of time, which has a common origin and possesses definite morpho-physiological and ecological characters and a definite geographical area of distribution, and is separated from any other similar population by a hiatus in the series of biotypes".

The question of the genus is discussed in the last chapter and it is shown that both systematic and evolutionary conclusions can be aided and sometimes corrected by studies of chromosome number and morphology, and the results of many of the more recent intergeneric crosses in cereals are summarized.

**63**

CHEVALIER, A. **63(44)**

Révolution en agriculture. (**Revolution in agriculture**).

Presses Universitaires de France, Paris **1946** : Pp. **360**.

The first part of the book is concerned with the history of agriculture from its origin to the present day. It tells how primitive man first began to plant the crops he needed for food and medicinal purposes instead of just collecting what was found growing wild and how he began to domesticate useful animals, passes on to agriculture in Egypt in the time of the Pharaohs, in ancient Greece and in the Roman Empire, and ends with a chapter on changes in world agriculture from 1880 to 1945 with special references to the U.S.A., Soviet Russia and France.

The second part deals with the present state of agriculture and the changes which are necessary for agricultural progress in France and her overseas possessions. Special attention is paid to agricultural education and research, and among other topics discussed are social problems and the use of agricultural machinery. The author considers that the reforms most urgent in the colonies are the better education of the natives and the raising of their standard of living. It is suggested that the creation of large co-operative farms somewhat similar to the Russian collective farms is almost everywhere possible and would produce valuable results.

There are three appendices dealing with the work of Vilmorin, the use of native languages in education in the colonies, and the creation of collective farms in Africa. There is also a bibliography.

The book can be thoroughly recommended as both interesting and informative.

63:35(73)

**Directory of activities of the Bureau of Plant Industry, Soils, and Agricultural Engineering.**

Misc. Publ. U.S. Dep. Agric. **1947** : No. **645** : Pp. **157**.

This pocket-sized directory gives a brief account of the history and functions of the Bureau, and its administrative organization. The following information is given for each field station: (1) the name and address of the official in charge; (2) the nature of the studies in progress, showing the Division concerned; and (3) the names of co-operating agencies. A map indicating the locations of the field stations is included.

WILSON, H. K. 633.1(73)
**Grain crops.**
McGraw-Hill Book Company, Inc. London and N.Y. 1948 : 24s. Pp. xi + 384. 114 figs.

This textbook for American students of agronomy is based on a course given by the author at the University of Minnesota. The first eight chapters are general topics, elementary botany, statistics, rotations, cultivations, weeds, diseases and pests. The next thirteen chapters deal *seriatim* with the crops, wheat, rye, oats, barley, flax (linseed), rice, buckwheat, millets, soya beans, field maize, sweetcorn, popcorn and sorghum. Two final chapters give accounts of the American methods of marketing and of the improvement of grain crops.

At the end of each chapter a list of questions is provided and numerous references are given, in full. The text is amply illustrated and there is an adequate index.

It is obviously impossible for an English reviewer to assess the value of a book for American readers about American agriculture, which is its primary object. For readers outside the United States, it may be said that a good deal of useful information about American methods and problems can be gleaned, forming a useful background for the study of American cereal breeding. In places, however, the author is apt to be obscure; for example the more northerly distribution of spring wheat compared with winter wheat is explained briefly in terms of summer temperatures, though one would expect winter temperatures to be more decisive. Again the author states that "farmers generally do not grow barley except to produce a feed or cash crop". One is left wondering "what else"?

In other places, and in sharp contrast with this obscurity, one finds occasionally an overwhelming lucidity, such as "Fibre crops are those grown for their fibre".

The final chapter, on plant breeding, is well done. J. L. F.

CRABB, A. R. 633.15:575.12(73)
**The hybrid-corn makers. Prophets of plenty.**
Rutgers University Press, New Brunswick 1947 : $3.00. Pp. xxv + 331 : plates.

*The Hybrid Corn Makers* purports to give, in as far as possible non-technical language, the history of the development of hybrid maize in the United States. The author, who has been engaged in agricultural journalism, and since 1942 has been a member of the agricultural department of the D. H. Brown Advertising Agency of Chicago, has collected much information from various sources, some of which appears for the first time, with the verve of the story-seeking journalist and high-pressure enthusiasm of the advertising world. In his preface, Mr. Crabb describes how he began to collect his information by interviews and contacts made by letters. Soon after he began working on the book, however, he decided "to see every living person who had taken a major role in hybrid corn development and get an account of his work from his own lips rather than depend upon letters and secondary sources of information". Mr. Crabb's work requires him to travel extensively in the States, and in the course of his daily job he has made himself acquainted with maize breeders, seedsmen and others concerned in the development and production of hybrid maize. By the middle of 1946, he tells us, he began to send portions of the draft manuscript to the appropriate informants so that facts could be checked, and any further information could be incorporated; this process was continued and we are informed that some sections of the book were re-written as much as four times. But apparently this claim is an advertiser's extravagance. At least one reviewer, F. D. Richey, examining the book in the *Journal of Heredity* on behalf of the American Genetic Association (cf. Abst. 1573), has denied that he was given the opportunity to see a draft of the material based upon the long conference with him, and complains of gross distortions and mis-statements.

Mr. Crabb roundly asserts in his preface that his book "presents material seventy-five per cent of which has never before been told for the general public, and at least a third of which has never before been set down in print anywhere". No doubt this computation is on the generous side. In principle, Mr. Crabb's plan of exhaustively collecting information from personal sources, before much of it would inevitably be lost for good, and welding it into a history of hybrid maize, was excellent and much needed. It is all the more regrettable that the result falls short of its great and dramatic scientific subject.

Chapter I, entitled the "Eternal Servant", traces the history of the cultivation of maize in Latin and North America, and *inter alia* describes every green plant as a "power pipeline extending directly to the sun". Chapters II and VII give a history of the early development of hybrid maize, describing the contributions made by East, Shull, Jones and Hayes and other pioneer maize breeders at the experiment stations. The author makes a real effort to unravel the roles of the different scientists whose work contributed to the main achievement of commercial hybrid maize production, and to throw light on their personal relationships. At points the search for priorities becomes tedious. But some interesting and new information emerges, and these chapters are the most valuable, least sensationally written part of the book.

A chapter is devoted to each of the four most important hybrid seed companies and personalities connected with their hybrid breeding work, viz. J. R. Holbert and Funk Bros Seed Company, Henry A. Wallace and his Pioneer Hi-Bred Company, the De Kalb organization, and Lester Pfister and the Pfister Hybrid Corn Company. In these chapters Mr. Crabb's advertising flare is usually uppermost. The chapter on Henry A. Wallace, however, is particularly interesting, and it dispels the popular legend that Wallace was one of the originators of hybrid corn, giving a balanced account of the nevertheless important contribution he has made to the success of hybrid maize. Kurtzweil's Copper Cross seed, produced by Wallace from two inbred lines already developed by D. F. Jones and F. D. Richey respectively, and produced commercially by G. Kurtzweil through the Iowa Seed Company, was the first hybrid to be developed and sold in the Corn Belt. Wallace also formed the first hybrid maize seed company; but perhaps his greatest contribution to the development of hybrid maize has been his publicizing work.

The final chapters deal with the recent development of waxy hybrid maize; the northern expansion of maize growing in Wisconsin made possible by breeding early maturing hybrids; the co-operative organization of maize improvement by the United States Department of Agriculture; technical developments in the hybrid seed industry; the advantages of hybrid maize and the bumper crops obtained from it on a reduced acreage during and after the second World War; and possible future developments in hybrid maize in the United States and other countries. In the last two chapters Mr. Crabb sells hybrid maize not only to the American citizen but to the whole world.

Yet, in spite of its several faults, including, as F. D. Richey has stringently shown, far too many inaccuracies, the book arouses interest in its subject. The scientific reader will no doubt be aware of the necessity of treating its facts and sensationalism with much caution. It is hoped that the non-scientific reader will not swallow the book wholesale, to use an expression which may have some affinity with Mr Crabb's jargon.

633.16:581.6

**Bottle beer quality. A 10-year research record at Wallerstein Laboratories.**

Wallerstein Company, Inc. U.S.A. 1948 : Pp. iii + 161. figs. tables.

A collection of 21 papers published between 1936 and 1947 from the Wallerstein Laboratories, New York, is here presented within the covers of a single, handsomely produced volume. The articles deal with a variety of topics bearing on bottled beer quality and contain a mass of useful information for brewers, but little of direct interest to the plant breeder as such. As with so many brewing research studies "quality" seems to be largely a matter of appearance and it is very heartening, therefore, to find that the last article makes an approach to the problem of flavour. J. L. F.

ROSEVEARE, G. M. 633.2/3(8+72)

**The grasslands of Latin America.**

Commonwealth Bureau of Pastures and Field Crops, Aberystwyth 1948 :
Bull. 36 : Pp. 291. figs. tables. plates.

The expansion of the livestock industry in Latin America since the 1880's has created in its wake the pressing problem of over-use of the land in many regions. For several decades the fertile nature of much of the grazing land bore the exploitation of the South American graziers without signs of any serious deterioration, although the land received no fertilizer except that supplied by the livestock; but in recent years the modifications in the physical and plant resources which have occurred through exhaustion of the land have caused increasing concern. In other parts of Latin America, on the other hand, the problem is not one of over-use but of an insufficient utilization of existing natural resources. Most of the Latin American governments and scientists are aware of the necessity of studying the problems that have arisen, and in many cases energetic and comprehensive measures are already being taken. The realization of the complex problems to be faced has led to the appearance of an increasing number of publications during the last twenty years on the subject of the Latin American grasslands; and in this bulletin an attempt is made to review the literature. Much scattered material has been succinctly covered; and works from a large number of journals, books and occasional publications, originally written in several languages by authors of very varied scientific standing, and dealing with all manner of ecological and economic conditions of management and production, are brought together for the first time.

The natural grasslands are classified into four main types, viz. good natural grasslands, such as the humid pampas of Argentina; cool mountain grasslands; semi-arid grazings; and the savannahs of hot climates. Chapters 2, 4, 5 and 6 give detailed accounts of these four types of grasslands, respectively. Chapter 3 describes the natural grazings in the Province of Corrientes, Argentina, and stock raising in the Argentine Chaco; the grasslands of these regions are transitional between type 1, good natural grasslands, and type 3, semi-arid grasslands; L. R. Parodi contributes this chapter. Chapter 7 surveys information on the use of the temporary ley. Chapter 8 deals with browse plants, and poisonous and undesirable plants, and includes a useful list of trees, shrubs and other browse plants eaten by or fed to stock in Latin America, with references to the literature in each case. In Chapter 9 the problems of erosion, and grassland and soil conservation are considered. Chapter 10 summarizes information on animal and plant health, including veterinary problems, plant pests and fungous parasites, and weeds. Chapter 11 covers management and improvements, and in addition to the natural grasslands considers sown leys, forage crops and farming generally. Botanical research receives attention in Chapter 12, under the following headings: floras; legumes; grasses; systematics; morphology, physiology and cytology; and exploration. Finally, Chapter 13 deals with co-operation, research and government action, including recent Congresses at which subjects of interest to the grassland worker have been discussed. A list of 30 pages of references arranged alphabetically according to author, an authors index, and a Latin index of plant genera and species complete the text. Photographs and 15 maps illustrate the valuable review.

## NEW JOURNALS

### *British Agricultural Bulletin*

The Editorial of the first issue (Spring 1948) of the *British Agricultural Bulletin*, a new publication of the British Council, emphasizes the importance of a freer exchange of agricultural knowledge, not only among scientists but among farmers, if the world-wide problem of increasing food output is to be successfully solved; and the purpose of this bulletin is to give farmers and citizens of other countries information on British agriculture. The bulletin cannot hope to meet the need of the specialist research worker for detailed knowledge of progress in his own field, but it will endeavour to give some account of scientific discoveries and technical developments which have reached, or appear to be approaching, the stage for application in farming practice. It will also give information on developments in extension and advisory work, rural economics and rural sociology.

The bulletin is published quarterly by the Agricultural Department of the British Council, 3 Hanover St., London W.1.; price per copy 5/-.

### *Food and Flowers*

*Food and Flowers* is a bulletin issued by the Agricultural Department and the Gardens Department of the Hong Kong Government, and edited by G. A. C. Herklots. The first number (April 1948) contains articles on vegetable trials in Hong Kong, miscellaneous fruits, various ornamental plants and the giant African land snail now firmly established in Hong Kong.

### *Physiologia Plantarum*

*Physiologia Plantarum*, a new journal dealing with all branches of physiology, is published quarterly by the Scandinavian Society for Plant Physiology and edited by H. Burström. Each number contains about 100 pages. The annual subscription for non-members is 40 Danish kroner. Orders may be placed with Einar Munksgaard, Nørregade 6, Copenhagen, Denmark, or with any bookseller.

### *Sweet Potato Journal*

The *Sweet Potato Journal*, the first number of which appeared in August 1946, deals with various topics related to sweet potato production for livestock feed, human consumption and industrial purposes in the United States, and is intended for the farmer, processor and marketer. The journal is the official organ of the Louisiana Sweet Potato Association. It is published monthly by C. Ford, 753 Gladstone Boulevard, Shreveport 38, Louisiana; single copy 25 cents, annual subscription $2.

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# Plant Breeding Abstracts

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